A Naval Safety Center Publication

approach

MARCH 1970 THE NAVAL AVIATION SAFETY REVIEW

The Thing

By A. W. (Tony) LeVier
Lockheed-California Company
Courtesy TAC ATTACK

As we come to the end of 1969 and look forward to a better year in '70, one of our mandatory tasks is to review our past year's experience in the accident and incident area. Right now there is something that needs to be said about loss-of-control accidents – and said loudly. While casting around for a vehicle to present our thoughts, we discovered this article in the December 1969 *TAC Attack* in which Tony LeVier, one of the world's leading test pilots, covers the problem in an outstanding manner.

THE five little racers are lined up abreast for a race horse start, barely 20 feet between wing tips. It's the start of the Greve Trophy Race during the 1939 National Air Races in Cleveland, Ohio.

I'm flying the Schoenfeldt Firecracker, the world's fastest 550-cubic-inch racer, and I'm sitting at the enviable lift end (pole) position. Lee Williams, a novice, is on my right. Further on are Art Chester, Harry Crosby and George Bayrs, in that order. We are headed south on the grass turf of the municipal airport. The No. 1 scatter pylon is slightly to my right and No. 2 is well to the left.

The starters' flags both drop and five angry little "beasts" leap forward. Williams, on my right, charges ahead and then, suddenly, turns left, forcing me to veer left too. Keerist! What's the matter with the guy? He's going for the wrong pylon.

Continued

The basic behavior phenomena of aircraft hasn't changed at all throughout the years.

My racer is heavy and accelerating slower than Williams'. The ground is rough and giving me plenty of trouble keeping the little bird under control. Sure enough, Williams is heading for the No. 2 scatter pylon. I decide to follow him. I'm all loused up and out of position to cut right.

I know my racer is tail heavy. We had just installed a 35-gallon fuel tank behind my cockpit and there is 20 gallons in it for this race. I could feel the weight, and the tail was dragging hard against the ground, even with full forward stick and the stabilizer adjusted for full nose down.

Williams is in the air. His takeoff looked hairy. With the nose dangerously high he catches it, then straightens out toward the No. 2 scatter pylon. I follow him into the air. Ye gads! Is she unstable. Every little bump makes her want to pitch-up or tuck under. I was expecting this to happen, knowing full well that the CG (center of gravity) was aft of the normal limit.

I started a wide left turn to follow Williams. He's just about to the pylon. Now he starts rolling into the turn. He's almost vertical and pulling back on the stick. Then it happens. The little racer, "Miss Los Angeles," also with a new rear fuel tank, pitches and snaps. Williams, the poor guy, in his haste and excitement, hadn't gotten the warning or just didn't understand what a rear CG meant. The racer, tumbling crazily, falls to the ground. I am directly over him when he crashes. God! What a start for an air race.

I circle on around to the left, as the rest of the racers pass around both scatter pylons. I eventually catch up and pass the other fellows, only to have my engine go sour, forcing me out of the race.

Even though I was out of the money, I learned a valuable lesson that day. All high-performance aircraft can, and do, perform maneuvers that result in out-of-control situations. The fighter pilots of today are faced with out-of-control maneuvers that can only be described as *"The Thing."*

Now, really, there isn't much difference in the way some of those early-day racing aircraft acted and our present day fighters. Today, the words "pitch-up," "pitch-down," "tuck under" and "post-stall-gyrations" are spoken by jet fighter pilots. Is this a whole new terminology for aircraft behavior? Not at all. The basic behavior phenomena of aircraft hasn't changed at all throughout my years of flying.

Take these "new terms": super stall or deep stall. I used to call it *catastrophic stability* in order to describe it. Anyway, I experienced it in 1933 during practice for an air show. I was going to do a series of dead stick loops. On my first attempt, the bird stalled inverted, and believe it or not, it wanted to stay inverted. I used every combination of control to get her off her back, but to no avail. The aircraft, an OX5 powered Travelaire biplane, was falling flat and absolutely so stable that it would have crashed inverted had I not hit turbulent air at about 1,000 feet. This upset the machine just enough for it to slide off on one wing. I was about to bail out at just that moment.

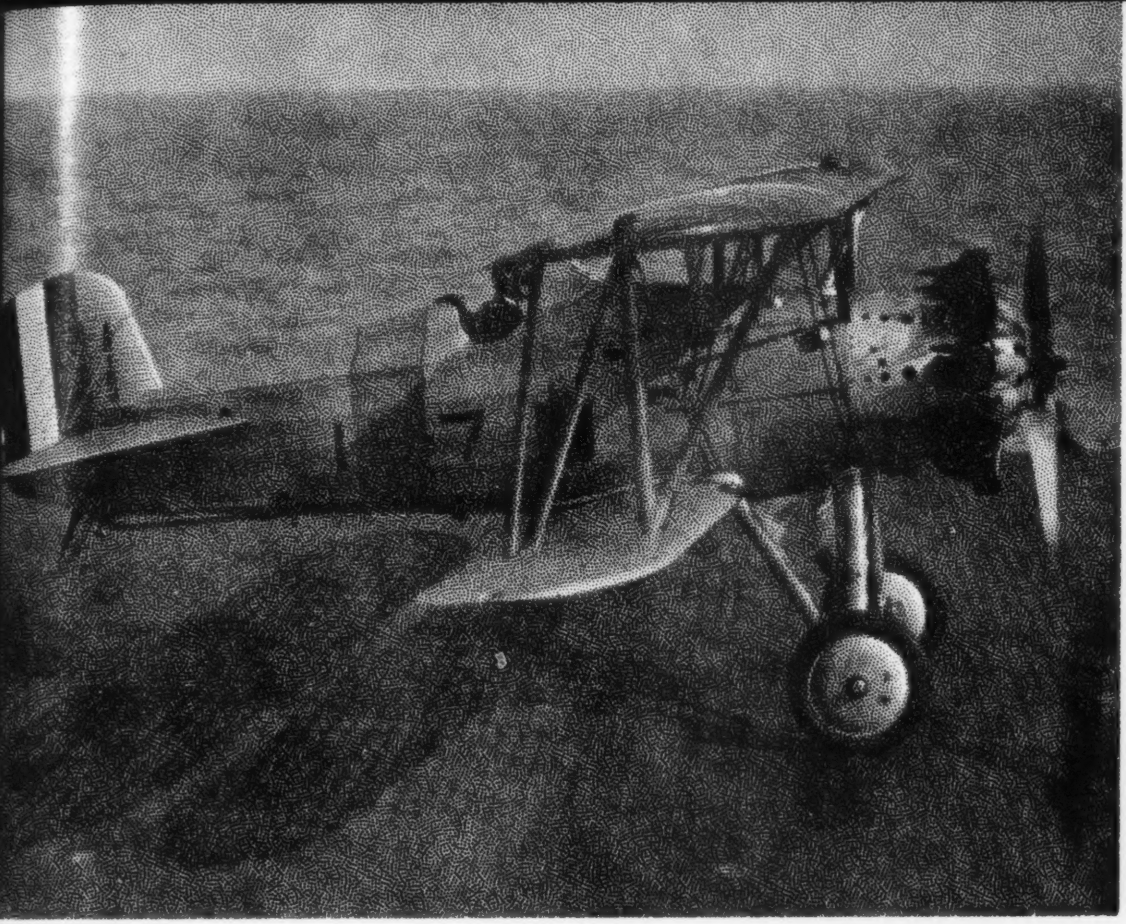
The only difference between those "early birds" and some of our very latest and hottest fighters is that they were lightweight and slow in speed. Generally speaking you could get away with making a lot of mistakes simply because you had a little more time to correct yourself. Even if a particular type of aircraft would snap at you for mishandling, you could recover by certain corrective action almost instantaneously.

Not so today. Our fighters, big and little, all have high wing loadings of over 100 PSF (pounds per square foot). And I think I'm correct in saying that none of them have a really clean bill of health when it comes to slow speed stability and control. That's what I would like to talk about now.

Slow Speed Stability and Control

By and large, we pilots tend to get into more trouble with an aircraft by fooling around at low speed and too low an altitude while executing some special maneuver. Often this pet maneuver is "verboten" by either the NATOPS manual or the SOP set forth by the particular command to which you are attached.

Also, and it's not exactly rare, some odd characteristics of new aircraft are not completely understood by everyone until such time as an accident or incident investigation reveals the flaw. Sometimes it takes a lot of pilot and aircraft losses to jar people loose to do something about it. In the meantime, "pilot factor" is only too often the final conclusion of an accident investigation report. I'm talking, of course, of those accidents that usually happen during seemingly normal circumstances . . . the pilot landed short, the aircraft stalled on base leg, etc, with everything else working OK.



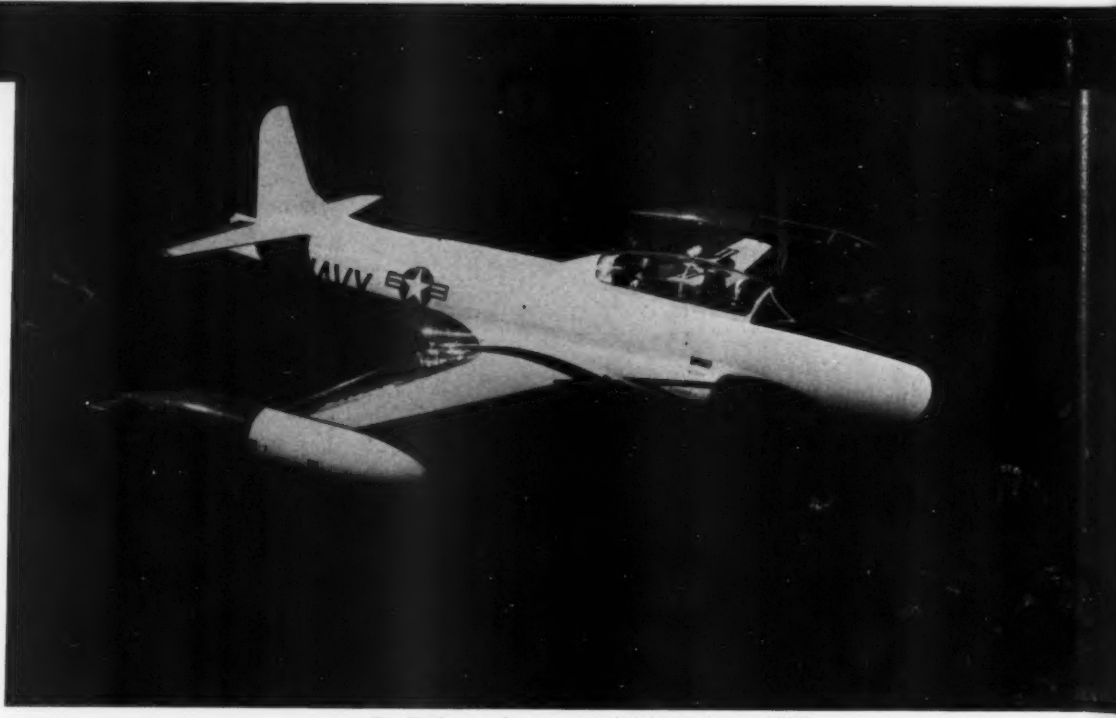
The F4B-1, a Boeing fighter, heads down the deck for takeoff. Developed in the late 1920's, this aircraft was a popular airplane with Navy pilots during most of the 1930's and was a typical high performance aircraft for that period.

Surprisingly enough, our skill levels are not always what they should be at any given time. Therefore, in my opinion, and this is strictly from my personal observation from working with all kinds of pilots, military and civilian for 40-odd years, there is a percentage in any group who will overextend themselves. From time to time they deviate from the standard and laugh about it . . . only if they get away with it. The helluvit is, frequently there's no one left to laugh.

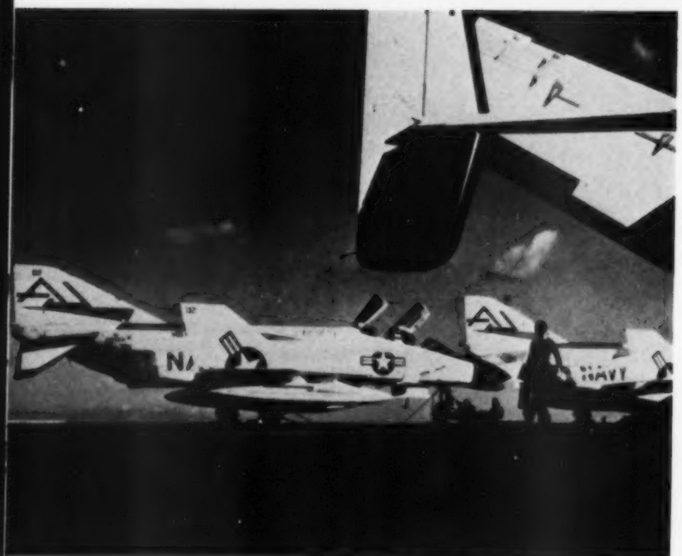
Several years ago a young ex-military pilot joined our ranks as a production test pilot. He was a darn good pilot, had an aeronautical engineering degree and wanted to be an experimental test pilot. We sent him to a military test pilot school where he distinguished himself as an outstanding graduate. Later on, he had his chance to join the engineering department as a full-fledged experimental test pilot. Again, he distinguished himself by performing important development testing on the world's first Mach 2 fighter.

He and I spent his last evening together, talking about his work. There were many things that bore on his mind. He once told me that he had never been frightened while flying an aircraft. Perhaps he hadn't, but it appeared to me that evening that test flying was getting to him. "Joe," I said, "there are times when we all have to back away from our work to assess ourselves and the tasks at hand. If your job is getting on your nerves, you may need a rest . . . need to get away from it for awhile."

There was work to be done and Joe was the last person to throw in the towel or to ask for time off. It was late afternoon the next day when he approached Runway 07 at Palmdale. Witnesses stated that the aircraft looked normal until about 15 feet off the ground. Suddenly the right wing dropped some 15 to 20 degrees. At that moment, the nose came up and the bank angle increased. Now the plane started to veer to the right and headed off the runway. Joe put in full power and afterburner to try and save the situation. The bank angle increased to about 70 degrees with the nose high. Then it struck the ground. The right outboard tip



The T-33 was a forerunner in helping understand PSG.



Tradeoffs must occur during the design of Mach 2 aircraft.

tank fin cleaved the ground first. The angle was measured at 70 degrees.

Joe was really a wonderful guy. Unusual for our day. He didn't drink, smoke, swear or raise hell like a lot of us do. His family life was very harmonious. But even with all these plus factors working for him, he still made one little mistake that day.

The particular aircraft he was flying did not yet have boundary layer air for the landing flaps. Therefore, all landings were to be made in takeoff flap position. For some unknown reason, Joe elected to use landing flaps. I had previously done the early investigation of the landing flap configuration and found that as you approached touchdown speed, the right wing dropped – not abruptly, just gradually. It seemed to sneak up on you. This was basically caused by span-wise air flow over the ailerons which rendered them ineffective just at the time you needed them most.

The accident investigation board did their job. No one could ascertain what happened. I recounted my experience with the bird during earlier tests, but they refused to accept it. Findings: Cause Undetermined. They just weren't listening.

Now, let's talk about another so-called new terminology – post-stall-gyrations. As time goes by, more and more pilots in various fighter aircraft are encountering these out-of-control maneuvers. The NATOPS manual might mention them with a WARNING or CAUTION and touch on the subject briefly, but you might conclude it to be of little significance.

Later on, when the service pilots get the bird and

Even the good old T-Bird back in its early days had a PSG we called 'The Thing.'

really put it through its paces, invariably someone, perhaps less experienced and not too long out of flight school, gets into trouble. Things get to popping. So what happens? Meetings are held and a Safety Supplement is issued.

I have had many hairy experiences during the early development of jet aircraft. Some of these birds had post-stall-gyrations like nothing you can imagine. Those of you who are relatively new to our jet-set and didn't fly the good old T-Bird (T-33) back in its early days might not know that it had a PSG (post-stall-gyration) that we called "*The Thing*." I invite you to read an article by Sammy Mason and yours truly in the February 1968 issue of "*Interceptor.*" It tells about the history of the T-33 stall and spin program, and what we discovered caused the PSG. Even though you may never have the occasion to fly the T-Bird, it will give you an insight into the cause of PSG for most fighter types.

Fighter Design

In order to design a modern fighter aircraft with Mach 2 plus capabilities, the designer must consider many things in determining the configuration he believes best to meet the military requirements. Usually the customer specifies the desired gross weight, payload, range, speed, operating altitude and related equipment to complete a weapon system. The manufacturer chosen as the prime contractor assembles his staff for the project. They, in turn, start the task of refining the design already proposed. What will it look like? Will it be a delta, swept or short, thin straight wing? High or low tail plane? Take your pick, we have 'em all.

Wind tunnel tests are used to optimize the design. Invariably, some undesirable characteristics rear up to bug the aerodynamicists. They make trade-offs here and there to try and improve the situation only to find that they adversely affected some other good characteristic. It takes a smart and patient engineering group to finally find a solution that will produce an aircraft acceptable to the customer.

However, and you must remember this, the trade-offs that are made in the final design of a supersonic fighter, in the cases I know of, have resulted in marginal low speed stability and control at high angles-of-attack. And, they all have some sort of undesirable handling characteristics during and after accelerated stalls.

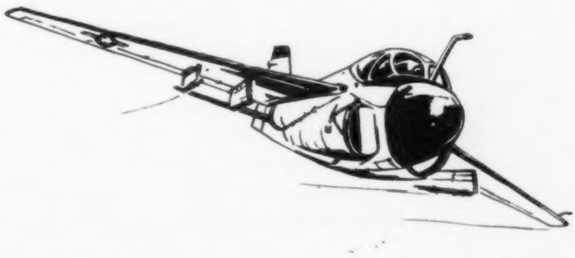
At traffic pattern speeds and altitudes, an accelerated stall most often will result in a PSG from which recovery will be extremely doubtful. When the modern fighter is man-handled into an abrupt pitch attitude of high angle-of-attack, several things happen almost simultaneously . . . and so fast that I defy any normal pilot to react quick enough to divert a wild ride.

Take a typical fighter, sweptwing, low horizontal tail, normal weight and CG. If the pilot, on the break for a landing, rolls and then racks it back to make an impressively tight turn, the air flow over the wings changes abruptly from chord-wise flow to span-wise flow on the underside and "burble" or flow separation on the top side. *Unless careful wing design prevails,* tip stall will occur which produces a forward shift in the CP(aerodynamic center of pressure). This in turn produces an extremely severe stalling moment (pitch-up). With a fast pitching rate, produced first by the pilot, plus the forward shift in CP, the angle-of-attack easily exceeds normal limits. The suddenness of the initial maneuver will usually mask or shadow any normal or artificial stall warning.

If incipient stall occurs, the aircraft may roll right or left. Roll application by the pilot may help trigger this condition, which can induce adverse yaw followed by *autorotation.* Under certain conditions one might expect a snap-roll ending up in a spin.

On the other hand, the long body (fuselage) and tail surfaces play an important part. When the wing stalls at the root it will affect the air flow along the aft fuselage, which also reduces the aircraft's directional stability. The vertical fin, now engulfed in a region of turbulence, can be partially stalled, reducing the directional stability still more.

Now, the forward body of the fuselage comes into



There is about a 50/50 chance for recovery from PSG below 10,000 feet AGL in most supersonic fighter aircraft.

play. It's there to carry the flight crew, some incidental equipment and usually sticks way out in front. It makes most aircraft look real racy. Right now it would be better to have a short forward body. The long forward body wants to bend back. It may tend to pitch the nose still higher if the wings are level, or yaw the aircraft to excessive angles if the airplane has rolled into a vertical bank attitude. The air flow produced by high angles of the fuselage body will tend to aggravate the flow of air across the aft fuselage and tail surfaces.

The sequence I have described takes place in about one and a half seconds at approach speeds. PSG is now in effect. You are going for one heck of a ride, like it or not. The speed of the aircraft drops so fast by virtue of the tremendous induced drag, that you will feel like you've been kicked in the face. There is, in my opinion, about a 50/50 chance for recovery under 10,000 feet above ground level in most supersonic fighter aircraft – and that's cutting it mighty close. These gyrations may even flame out the engine, which certainly compounds your problem. At traffic pattern altitude, you had better punch out pronto!

Let me tell you what happens with an F-104 in a high-speed pitch-up. The actions of the *Starfighter* can be compared to the maneuvers I went through when the turbine wheel let go on an early P-80 test flight and cut the whole damn tail off! You can imagine the resultant gyrations.

I was selected to be the project test pilot for the first flight of the XF-104 and subsequent Phase I development. The phenomenon of negative static longitudinal stability at high angles-of-attack had been detected in wind tunnel tests. It was given the name "pitch-up," but little was known of it at that time. The solution to this would only be resolved later during flight tests. I was informed of the characteristic, although no one was sure what the bird would end up doing. I, obviously, approached all stalls with great caution.

In the one G level stall tests, I encountered the point of neutral static longitudinal stability. As I cautiously continued to pull the stick back (about 145 knots) the bird would just sit there, nose high on the horizon, buffeting like crazy. Suddenly, lateral instability set in causing the bird to flop so fast that I couldn't keep up with it. I shoved the stick against the forward stops and the aircraft still wouldn't respond. I had found the neutral point and then exceeded it by a very small margin so that the aircraft was becoming divergently unstable. I was on the verge of pitching up. If a pilot were to make a rapid pull or jerk he could easily go through the neutral stability point and get into an uncontrollable pitch-up maneuver.

I didn't lose complete control during those one G tests – just almost. The thing I did notice, though, was that as I pulled back on the stick gradually to reduce speed and reached a fairly high angle-of-attack, the aircraft began buffeting quite severely. The stick force, of course, was high because of artificial feel force springs. This produced a false impression that shadows the somewhat sudden change in longitudinal static margin at the critical angle-of-attack. At the time, we did not have an APC (automatic pitch control) system.

Later on we started doing what we called "V-G test" . . . how many G the bird would produce at a given indicated airspeed (Vi)! This particular test called for 30,000 feet, Mach = 0.9; not to exceed 325 knots Vi (for safety considerations).

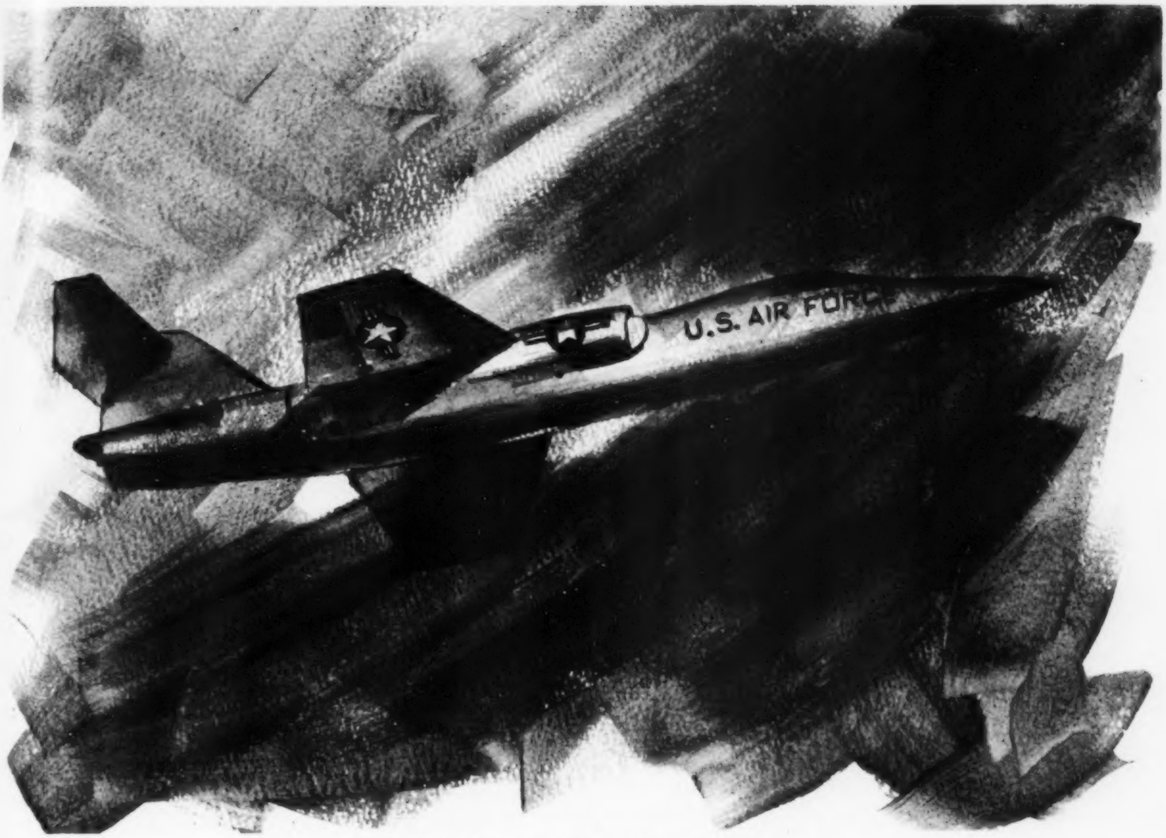
Test 1: Trim for one G flight, then pull a steady one and a half G in a turn to study stability, control and buffet onset if any. There was no buffet.

Test 2: Pull two and a half G. This produced light buffet, no appreciable change in stability and control.

Test 3: Pull three and a half G. This produced very heavy buffeting and lateral oscillations that I could hardly keep up with. I was holding three and a half G steady for about one complete turn when all of a sudden the bird pitched and rotated so fast and so violently I thought the tail had parted company.

This reminded me of the P-80 turbine failure incident which I mentioned before. I thought of four things, and acted on the fourth. The tail broke off . . . I've got to eject . . . I have the stick in my hand . . . I pushed it forward and the aircraft straightened out and flew off as though nothing had happened.

I was somewhat shook. My chase pilot failed to see the maneuver. I requested a visual inspection but he



An F-104 in a high-speed pitch-up is a real thrill!

could find nothing wrong with my aircraft. Everything seemed normal in the cockpit. Even so, I discontinued any further testing. This may well have been the first pitch-up maneuver and successful recovery of a supersonic fighter.

I made my report. Both Lockheed and the Air Force thought only a "stick shaker" was necessary. Besides, they reasoned, the natural aerodynamic buffet and lateral oscillations were a very strong and effective warning system. Most people at the time didn't appreciate this new phenomenon until another fighter pitched up on takeoff and crashed. This brought everyone's attention to the phenomenon of pitch-up and post-stall-gyrations. As a result, an APC system was installed.

Now, the sad part of modern-day flying is this: pilots can't experience these strange happenings because they are forbidden. Read any NATOPS manual and it *warns* you about slow speed flight, or to avoid a deep stall, and that spins are prohibited. Only by accident are you allowed to experience them. Some make it, some don't.

A couple of years ago a fighter pilot trainee made a weapons delivery pass on an Air Force range. On the pull-up he went into a crazy gyration and crashed. The pilot ejected only to smack the ground before his chute worked. The base commander and operations personnel tagged it as a flight control problem. Why would an aircraft do such a wild maneuver unless the flight controls suddenly went ape? It was a natural thing for them to think.

I thought differently. The bird had a clean bill of health with the hydraulic flight control system. I suspected pitch-up. I visited the air base and talked to the accident investigation board. I found out that this unit was flying at low altitude with the APC inoperative because they had experienced several malfunctions. The system was giving them stick kicks during low level pull-outs. They hadn't lost an aircraft due to their APC malfunctions, but now they chose to expose every aircraft and pilot to possible pitch-up at low altitude during the pull-out on gunnery range training.

We showed them motion pictures of pitch-up. One of

Every pilot flying supersonic fighters must be made aware of what PSGs are, what causes them and how to avoid them.

the range witnesses said, "That's it, that's what the bird did." There was still some doubt in their minds, but the final report came out . . . probable cause: pitch-up.

In summing up the situation as I see it . . . the loss of aircraft due to "*The Thing*" can be reduced very drastically by two steps.

1. Every pilot flying supersonic fighters must be made aware of what post-stall-gyrations are, what causes them and how to avoid them, particularly at low altitude where recovery is unlikely. At normal traffic pattern altitudes and during takeoffs, approaches and landings, *you must learn to handle the birds with kid gloves.* There is no requirement for aerobatics in the traffic pattern. *(Amen!! – Ed.)*

2. Any supersonic aircraft having undesirable low speed stability and control characteristics wherein at high angles-of-attack the static margins become neutral or negative about any of the three axes, I strongly recommend an APC system to preclude any possible chance of a pilot encountering an uncontrolled stall maneuver . . . *"The Thing."*

I believe the young officers of our military air forces of today are as fine a group of young men as I have ever had the pleasure of meeting. There's really little difference, that I can see, from pilots of 25 to 30 years ago. But now we have extremely expensive high-performance aircraft that cost 10 to 15 times more than in World War II. Mission requirements are more demanding than ever before, requiring far greater attention to every detail of flight operations. Today's pilots, as a whole, are better educated.

Where, then, do we fall down? I think the young military pilot has to be hand fed and carefully watched for a much longer time than he is at present. With his formal training over, he joins a squadron and is expected to fit in and carry his weight in a very short time. I believe the system has cut this time period too short. This is, I am sure, the result of budgetary considerations. I have said it before and I say again – a little more time, a little more training and I believe the so-called cost effectiveness and accident rate will improve.

Many years ago I recognized the need of pilot support for the world-wide F-104 program. I convinced our management to send out our best qualified pilots and engineers on company-funded trips to assist the units in all phases of their operations. We printed books that contained lectures explaining all the whys and wherefores of the warnings and cautions in the handbook. We explained to all the pilots how we arrived at all the limitations on the *Starfighter*. This support program is still being funded and I'm convinced it's paid off in a big way for us and our customers.

For all you eager young pilots who are just beginning, I want to advise you to think ahead to the time when you'll have bags of experience in your fighter bird and be confident that you can lick anything in the skies. Until then, look at yourself; size yourself up. Don't kid yourself on how good you are – prove it by playing the game straight. Go by the rules or you go alone.

And watch out for *"The Thing"!*

Editor's Note

PRO AM

VIVE LA DIFFERENCE

EVERY group of professionals, be they aviators, golfers, doctors or lawyers, has divisions within the group which separate the men from the boys. In the top division there are the real pros, the superstars like the Lindberghs and Rickenbackers, the Sneads and Palmers, the Pasteurs and Stapps, the Holmes and Darrows. In the middle division there are the hard working conscientious types who perhaps enjoy brief moments in the limelight but are not classified as brilliant. In the bottom division we find the hackers, quacks and shysters. These are the ones who have the training but are short on ability, interest and dedication. Another way of looking at this is through performance. In the top category there are those who consistently come up with outstanding performance – the ones who rise to the occasion under pressure. The middle group covers those to whom second effort is routine – the ones who occasionally get the big 4.0. Those at the bottom are the uninformed/misinformed feet draggers whose performance under routine conditions leaves something to be desired and whose performance under pressure usually wilts.

Opposites

In order to illustrate the difference between professional aviators and plain old throttle pushers let us consider two similar occurrences. Both involved airborne emergencies but the real difference exists in how they were handled. In the first case, an incident, the pilots were on a test flight after a calendar inspection. They were performing a feather check on No. 2 engine's propeller when suddenly No. 3 engine backfired and quit – RPM decreased and fuel pressure dropped to zero. The pilots analyzed the situation quickly and correctly and while the copilot retarded No. 3's throttle, the pilot unfeathered No. 2's propeller and brought that engine back on the line. The pilots then completed the secure checklist for No. 3 engine and returned safely to Homeplate.

The second case, an accident, also concerns a multi-engine aircraft and occurred late one afternoon. The throttle pushers in the cockpit were both qualified and designated in type. The aircraft commander had a total of about 1,000 hours and 104 hours in type which included night and instrument time. The copilot's credentials were similar: about 1,300 hours total time and 204 hours in type. The accident occurred after the aircraft departed the field and was climbing out. The mission was a passenger pickup flight. The crew had gone to a staging point to pick up some passengers and a few supplies and were returning to base. About five minutes after takeoff one of the engines failed and soon thereafter the second engine was lost. To the everlasting credit of the throttle pushers whether by

luck, skill or both, they ditched successfully. None of the crew or seven passengers aboard were even bruised and, though they all got wet, everyone was quickly rescued.

Behind the Scenes

Undoubtedly many readers by now have breathed a sigh of relief. Other readers, somewhat more callous, have thought, "So What?" The curious readers have already deduced that there is more to the story and are wondering what the AAB (Aircraft Accident Board) and endorsers had to say. Investigation of the accident and subsequent salvage of the aircraft brought to light many interesting facts.

• When power loss on one engine occurred, neither pilot determined which engine had failed. Later, neither could recall any engine instrument readings. The copilot, who was at the controls at the time, prepared for single engine flight. The aircraft commander retarded the No. 1 engine condition lever for a restart (a random selection) but as it turned out, this was the good engine. Now both engines were inoperative. One endorser said, "*The pilot and copilot were unsure of their single engine procedures and a certain amount of confusion existed while the control of the aircraft was passed from copilot to pilot.*" Flight safety lectures, standard operating procedures and the NATOPS program are all designed to do one thing – eliminate guesswork and reduce to an irreducible minimum the amount of improvisation that takes place when an emergency occurs. Checklists exist to help those faced with an emergency to take corrective action rather than compound their problems. Another endorser said, "*That several NATOPS procedures were omitted or incorrectly done is a gross understatement of fact . . . it appears obvious that both pilots exhibited a total lack of NATOPS procedures, knowledge of aircraft systems and judgment. Almost any course of action, other than the course of action selected by the pilot, would have prevented this accident.*"

• The pilots had not conducted any cockpit briefing or discussed what would be done in the event of an emergency. In any multi-piloted aircraft it is incumbent upon the aircraft commander to thoroughly discuss with his copilot what is going to be done, by whom and when. The days are long gone when the aircraft commander says, "I'll take the throttles to the firewall and you take us home." A sample briefing, before takeoff, to cover just such an emergency as this might have gone as follows: "and if we lose an engine after takeoff you fly the plane (specific), together we will determine what the nature of the emergency is (specific), if we have to secure an engine I will secure it while you start back to the field (specific), I'll call the tower and tell them what our trouble is (specific). Any

Passenger Ditching Procedures
(TYPICAL HANDOUT)

(1) Remain calm, the crewman will assist you in every possible way.

(2) Remain strapped in tightly until you are told to exit the helicopter, then move to the nearest exit and depart rapidly.

(3) Follow the dotted lines (diagram) from the numbered seats to the exit indicated.

a. Push windows out.

b. To jettison the door, turn yellow handle marked "EXIT RELEASE."

c. To jettison the cargo hatch window turn the yellow handle marked "EXIT RELEASE."

(4) *Do not* inflate your Mae West until you are outside the aircraft.

(5) Orientation straps are installed to assist you in locating an exit. If necessary, pull yourself along the strap to an exit.

(6) Remain seated and strapped in at all times unless otherwise directed.

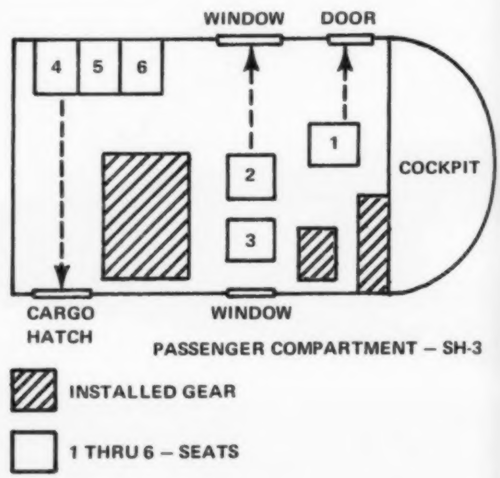


Fig. 1

questions?"

- The passengers had not received any briefing and although all were given life vests and told to strap in, the cabin attendant did not check to see that the passengers were ready. After ditching, several passengers had to waste time putting on life jackets. One endorser said, *"All passengers must utilize (wear) Mae Wests on flights over water . . . and the pilot must ensure compliance with this requirement."* It must be assumed by all flight crews that passengers are *not* familiar with the aircraft in which they are being carried. Cabin attendants must ensure, before takeoff, that all passengers have correctly donned survival gear, and then must check to see that safety belts are properly fastened. Passengers then must be briefed on procedures to be followed in the event of ditching or crash landing, what escape routes are to be used, what rafts to use and where they are located. *The whole nine yards!* Above all, pilots must not start a takeoff until advised by the cabin attendant that the briefing has been completed. Fig. 1 illustrates a handout that one helicopter squadron gives to all passengers. Fixed wing operators use similar handouts.

- The sea was calm and the aircraft seemed to be floating pretty well; so everyone remained inside. (It floated about 20 minutes.) One endorser said, *"Passengers of a ditched aircraft should evacuate after all motion has stopped even though the aircraft may appear to be floating well."* Whenever it is necessary to ditch an aircraft and when one is lucky enough to ditch in calm seas, the first order of business is to break out the survival equipment, evacuate the aircraft and get everyone prepared to assist in the SAR effort to follow.

Emergencies

It makes one wonder, when accidents of this type occur, what causes human beings to forget/disregard/blank out. From the very beginning of flight training, pilots are taught, drilled, coached and instructed to take it easy when emergencies (real or simulated) arise. An article which appeared in the Sept 1969 issue of APPROACH sums up the situation as follows:

Pilots and flight engineers should handle simulated and actual emergencies in the same manner, i.e. completely analyze the situation before taking any action rather than compound the problem by doing the wrong thing hastily.

Seldom does a system malfunction occur without either a warning or a reasonable amount of time to perform calculated, unhurried procedures. The best insurance against aggravating an undesirable situation is the thorough knowledge of emergency procedures and calm execution of the correct checklist after assessment of the problem.

Knowing the correct emergency procedures backward and forward, day and night, blindfolded or eyes open is not only good common sense but is also expected of all naval aviators. In this profession of ours we don't have the time, assets or manpower to carry the submarginal performer. There is no place in Naval Aviation for the amateur.

About Radial Tires . . .

AN airman lost his life in a private motor vehicle accident, and investigation revealed the car was equipped with a radial tire on the right front wheel with conventional tires on the remaining three wheels. This condition was considered a significant accident cause factor. It was suspected that the radial tire held a true track while the conventional tires lost traction and caused the skid that resulted in a head-on collision.

The mixing of radial and conventional tires is a safety hazard! Preferably, radial tires should be installed on all four wheels. If only two radial tires are installed, they should always be used on rear wheels. Radials should never be installed on the front wheels with conventional tires on the rear.

The basic design of radial tires is such that when you turn the steering wheel, they immediately take up the new tire heading without the normal side deflection of conventional tires. This would produce a skid in the case of conventional tires on the rear and radial tires on the front. The use of only one radial tire on the front is highly dangerous, even under ideal road conditions.

Quoted from SAC Safety Bulletin

Short Snorts

You can't pull yourself out of your troubles with a corkscrew.

Anon.

E-2A Power Management During Carrier Landings

AFTER a night carrier bolter the E-2A pilot encountered difficulty in advancing the power levers from FLIGHT IDLE. As the aircraft settled dangerously close to the water, the copilot assisted the pilot in slamming the power levers down and forward. With full power, the aircraft commenced a climb and was flown ashore to check for possible damage.

The power levers had been inadvertently retarded to FLIGHT IDLE when the aircraft went high in close. Upward force accompanying the aft motion of retarding the power levers placed them in the transition area between FLIGHT and TAXI ranges. This position restricted forward movement of the power levers until the copilot forced the levers down. Only three-eighths of an inch up movement of the power levers will restrict forward movement.

The reporting custodian recommended that the power lever quadrant be redesigned to allow unrestricted movement of power levers from TAXI range to FLIGHT range while retaining FLIGHT range to TAXI range restriction. Action on this recommendation is pending. Commander of the air wing involved subsequently issued a message which stated in essence:

- The recent near loss of life has again dramatized the extremis situation which can result from a premature retarding of power levers below FLIGHT range prior to completing arrestment on a carrier landing. Two prior mishaps of a similar nature resulted in promulgation of Interim Change No. 14 to the E-2A NATOPS Manual (NavAir 01-85WBA-1, Rev. 15 Jul 68). This change is quoted again in order to reemphasize its contents:

"*Warning:* Maintain approach power upon touchdown, day or night, until the aircraft has come to a complete stop."

The air wing commander also noted that there is no technical, operational or professional justification to violate this warning. There is no proposed, planned or pending hardware change which can ever be implemented that will substitute for pilot conformance to prescribed procedures.

Oil Is Cheaper Than Parts

THE TA-4B pilot was on an extended cross-country flight and had made servicing stops at three bases (one Navy and two Air Force) where servicing personnel were unfamiliar with TA-4B aircraft. After takeoff following his third servicing stop, the pilot climbed to FL 200 and leveled off in normal cruise. Shortly thereafter, the pilot observed the oil pressure to fluctuate between 25 and 35 psi. He reduced power to 90 percent RPM and at 45 miles from his destination, further reduced power and commenced a letdown. Oil pressure fluctuated between 15 and 25 psi during approach and landing.

Subsequent investigation revealed that the aircraft had flown 7.6 hours without the addition of engine oil and that 11 1/2 quarts were required to refill the reservoir; hence low pressure indication. The incident necessitated an engine change. (*The TA-4B has a maximum capacity of 16 quarts – Ed.*)

The commanding officer noted in his endorsement to the incident report:

"A basic responsibility of the pilot in command of an aircraft is to ensure its proper servicing. Prudence dictates that a pilot on a cross-country flight should take the few extra moments necessary to see that his aircraft is serviced properly, especially when it is being done by personnel unfamiliar with his model aircraft. The pilot involved in this incident was indeed fortunate that his engine did not seize from oil starvation during the final leg of the flight."

Curb the Urge to Get Home

"IF we could just get another wheel from (the station) we should be able to fly home."

From an AAR

Insure that your aircraft is ready for flight in all respects. Few missions are of sufficient importance to justify shortcuts and get-home-itis is one "Deadly Disease" (see July 1969 APPROACH) we can all do without.

Not Too Hot To Handle

A MARINE 1/Lt, piloting a HUEY on a mission in Vietnam was confronted with a very unusual situation. His helicopter was carrying a normal load of ordnance which included a couple of pods of 2.75 rockets. During a rocket run the pilot, who was accompanied by his crew chief, elected to fire the right rocket pod for target marking purposes. As he entered a steep descending right turn on his run a warhead separated from its motor, slid out of the left rocket pod, entered the left cabin door, struck the crew chief on the leg, continued forward striking the pilot on the helmet, then fractured the left windscreen and finally came to rest on the cockpit deck. The pilot, who fortunately was not stunned, picked up the warhead and calmly dropped it out of the side window – *and in typical Marine fashion no doubt scored a direct hit.*

In an effort to prevent a repeat performance of this unusual incident the squadron ordnance crew personnel directed their efforts to insure proper torquing of warheads to rocket motors. It was suspected that helicopter vibrations had been responsbile for separation of the warhead from the motor. A complete check of all built up rockets in the squadron inventory and a review of proper technique for assembling warheads and motors was made.

Here, as throughout aviation, torque sense has inestimable value. *Torque it right and it will stay tight.*

Routine Landing

INSTRUMENT meteorological conditions prevailed over most of the state of Texas. Ceilings varied between 500 and 1000 feet and the overcast extended to above 10,000 feet. It was not a good setting in which to lose all electrical power but that is the time the generator of the TF-9J happened to let go.

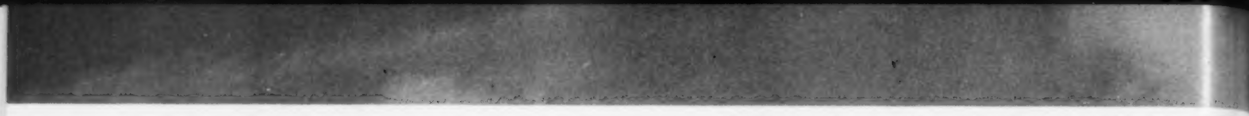
The pilot had filed an IFR flight plan to El Paso and had just reached cruising altitude, FL310, when all electrical power except the emergency battery system was lost. He followed the NATOPS Electrical Failure Inflight Checklist and turned off all recommended electrical equipment, selected the emergency battery and broadcast his predicament on guard frequency. He wanted to rendezvous with another squadron F-9 which he knew was somewhere in the general vicinity. However, strong winds aloft and a different route by the other F-9 accounted for the two planes being over 100 miles apart.

Austin Approach Control heard the pilot's broadcast on guard and vectored a Grumman *Gulfstream* to a successful joinup and cleared them for an approach to Bergstrom AFB. The *Gulfstream* led the TF-9J down through the overcast and they broke out at 400 feet and about three-fourths of a mile from the approach end of the runway. The landing was routine.

Communications between the *Gulfstream* and the TF-9J was not mentioned in the incident report so it is assumed that neither was equipped to talk to the other – the *Gulfstream* probably had VHF only and the TF-9J had UHF only. During descent the *Gulfstream* dirtied up without warning. The TF-9J overran him slightly but did manage to get back into position. Formation penetrations in IFR conditions by different types of aircraft should be attempted only when absolutely necessary. The TF-9J pilot had requested that the two planes dirty up prior to entering the overcast but the word did not get to the *Gulfstream* pilot.

Action taken by the TF-9J pilot from the onset of his troubles is the kind of headwork that makes everyone smile. He knew his plane. He knew and executed emergency procedures correctly. He did not hesitate to declare an emergency, which enabled others to quickly help him. He stayed ahead of his aircraft and demonstrated excellent airmanship by staying on the *Gulfstream's* wing and was in position and ready to land when he broke out just about at minimums. Undoubtedly the TF-9J pilot has added the controller at Austin Approach and the pilot of the *Gulfstream* to his Christmas card list.

The cause of this incident was a failure in the generator housing assembly – a broken armature grounding field.



CRT, Safety and You

By CDR H. L. Fremd
Training Analyst
NavSafeCen

CRT (combat readiness training) is defined as that flying performed under competent orders by aeronautically designated personnel, primarily for the purpose of maintaining basic aeronautical skills during periods of active duty assignments wherein they are restricted from flying with sufficient regularity and scope to maintain a high degree of operational readiness. This is the official definition, as stated in the General NATOPS Manual (OpNavInst 3710.7D), but let's stop and take a closer look at what the aforementioned definition means to you and me.

Just a minute . . . . don't say it can't happen to you because sooner or later all Naval aviators will receive fateful orders to proficiency billets. It's sorta' like death and taxes – you can count on it. So, let's examine some of the pitfalls of CRT flying. First comes the shocking realization that you have orders to a non-operational billet as far as your flying is concerned. This is rationalized away as being necessary to a well-rounded naval officer's career. So, sick at heart, you trudge away to this new challenge of your abilities to administrate, avoiding the submission to proficiency flying as long as banked flight time will permit. But, alas! the day finally arrives and fly you must. Then you

learn the true meaning of the term "combat readiness proficiency training," i.e., what you do in an aircraft is readiness proficiency training; what you have to do initially to get the aforementioned aircraft is combat.

It is at this point that the CRT pilot must take two things into consideration: the length of time since his last flight and his possible lack of familiarity with the aircraft he is about to fly.

By definition, you are restricted from flying with sufficient regularity to maintain the highest degree of readiness, so admit it and use all the aids which are available to you. Read the aircraft NATOPS Manual. Learn the aircraft systems, operating limitations and characteristics and in the process, don't forget your IFR procedures. Review the General NATOPS Manual (OpNavInst 3710.7D). Change 6 is out now so if you haven't already checked it over, do so. Keep your flight gear up to date – nomex flight suit and gloves, steel-toed boots, survival knife and all of your other equipment. Be sure you dress for the weather in the area over which you are going to fly and not according to the cockpit temperature. Know your local course rules; not vaguely but well and, last but not least, be sure that you are physically ready to fly.

When you get to the aircraft – don't rush. Use the book to conduct a proper preflight. Never fail to make use of all the checklists available, on the ground or in the air. After you get airborne, be cautious: don't let that silky-smooth takeoff which you just made lull you into a false sense of proficiency. Don't yield to the temptation to perform unauthorized maneuvers or those beyond your reduced abilities.

Maybe I'm being, as the kids say, a real cube (that's a square in 3D) but this is a situation where the unwary is ripe for an accident. Statistics prove it.

Basically, the point to be made is that aviators in CRT billets are categorically reduced in proficiency from the status they enjoyed in the fleet. In operational squadrons there is always someone who sees to it that pilots are kept informed of NATOPS and instrument regulation changes, aircraft service changes and variations to local course rules. In addition, regularly scheduled aircraft simulator periods provide frequent refreshers on emergency procedures. In the CRT environment it's another story. It is up to the individual pilot to be as current and knowledgeable about his aircraft and area of operations as possible.

If you have a question concerning any phase of instrument flight for which you cannot find a satisfactory answer, send it to Commanding Officer, VA-127, NAS Lemoore, Calif. 93245, who has volunteered to do the necessary research and supply the answers.

ON THE GLIDE SLOPE

Once again we feature some of the questions most often asked by our readers seeking the

Answers from Aggie

Question: When cleared to a lower altitude how fast should I descend?

Answer: According to the Airman's Information Manual you should descend as rapidly as practicable down to 1000 feet above the assigned altitude and then descend at 500 feet per minute until the assigned altitude is reached.

Question: I would like to file to an Air Force base which has an enroute radar/tacan approach. What do I list as my IAF (initial approach fix)?

Answer: You may correctly file to any published initial approach fix at your destination *except* those associated with an enroute radar/tacan approach. Enroute penetrations are utilized when requested while airborne or in conjunction with enroute descents during which comm is lost, but are never to be used for flight plan filing purposes.

Question: I've heard pilots discussing "offset navigation" to an IAF. What do they mean?

Answer: "Offset navigation" in this case refers to the maneuvers a pilot might use to align himself with a penetration course prior to crossing the IAF. Such maneuvering is not allowed unless it is specifically requested from and approved by ATC. According to NATOPS Instrument Flight Manual, Section IV, Part 5 and FAA Order 7130.1A you must:

(1) Turn *at* the IAF in the shortest direction to intercept the initial course

outbound.

(2) Begin descent from the initial penetration altitude heading inbound and when over *or* abeam the IAF. *Abeam* means that the aircraft's heading is within 90 degrees of the initial approach course.

Question: Aggie, can I level off at DH (decision height) on a PAR approach and fly to the visibility minimums, then take my missed approach if I don't see anything?

Answer: No, you cannot level off at the DH and fly to the visibility minimums. According to the TERPS Manual (OpNavInst 3722.16A), a missed approach shall be initiated at the DH if the required visual reference has not been established on a PAR approach.

Question: In the fog center of the U.S., there are days when visibility is very poor. If approach control gives me a report of a 200 foot ceiling and one-fourth mile visibility and an RVR (runway visual range) of 24, does this mean that I can't fly that approach in a single-piloted aircraft?

Answer: Even though the prevailing visibility is reported to be one-fourth mile you may fly the approach if the RVR is 24 (an RVR of 24 equals one-half mile). The TERPS Manual (OpNavInst 3722.16A) states that RVR may be used in lieu of meteorological visibility in the approval of straight-in instrument approach procedures and for takeoff minimums.

Question: How should I compute the "ETE to alternate" as required on the DD-175?

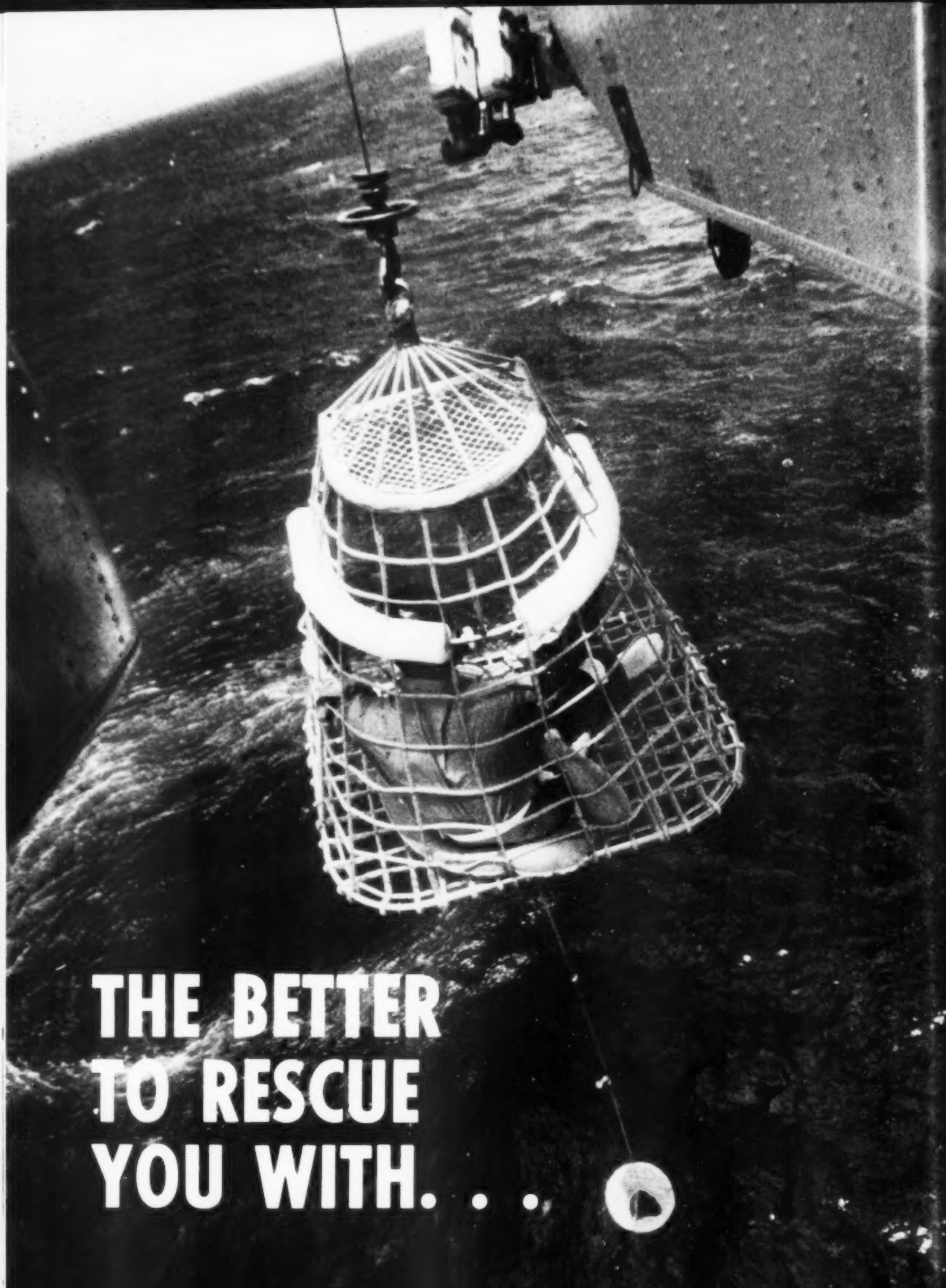
Answer: According to the Flight Planning Document, Section II, the "ETE to alternate" as required on the DD-175 will be the "time required to fly from the original destination to the alternate airfield, based on flight at the last cruising altitude." It is obvious, however, that this figure will not be entirely correct if flight from destination to alternate is planned for some other altitude. Therefore, it is prudent to keep in mind that the "ETE to alternate" as required on the DD-175 is an *estimated* time enroute and that there are a number of possible ways in which the *actual* time enroute could turn out to be different from the ETE. This will be particularly true if the flight to the alternate takes place after a missed approach at destination. Additionally, the pilot must recognize that fuel reserves required by the General NATOPS Manual do not include fuel for an approach at destination. Therefore, the pilot should not fail to take this fact into consideration in his flight planning. We hope that a prudent pilot would not commence a penetration to a destination airport having marginal weather without being certain that he has sufficient fuel for the penetration/approach, a missed approach, enroute flight to, and penetration/approach at, the alternate airport.

Question: I am flying a single-piloted aircraft and commence an approach at my destination with the weather reported to be 300 feet and one mile. At six miles on PAR final, the field is reported to be 100 feet and one-half mile. If I break out at 200 feet, may I land?

Answer: You may land provided you receive clearance to land and do in fact have the runway or runway environment in sight at your decision height.

Question: If I had to execute a missed approach at my destination, at what altitude and by what route do I proceed to my alternate, assuming a no-radio situation?

Answer: In a no-radio situation you should proceed to your alternate by the most direct route at the minimum enroute altitude for the structure you filed for. Eighteen thousand feet MSL is the MEA (minimum enroute altitude) for the jet route structure, unless otherwise published. Squawk IFF Code 7700. This situation is not covered in any publication at present and the pilot is expected to "exercise good judgment in whatever action he elects to take." ◄


THE BETTER
TO RESCUE
YOU WITH. . .

RESEARCH, development, test and evaluation of air rescue devices has been continuous since the helicopter became the primary rescue vehicle. The sling (horse collar) which for years was the primary air rescue device is still in use today. The Boyd seat, an aluminum three-prong seat which was introduced in the late 50's, was an improvement over the sling because it had the capability of lifting two persons simultaneously and it required no special training to use – just sit on the prong and hold on. This device, like the sling, is also still in use.

The New Generation

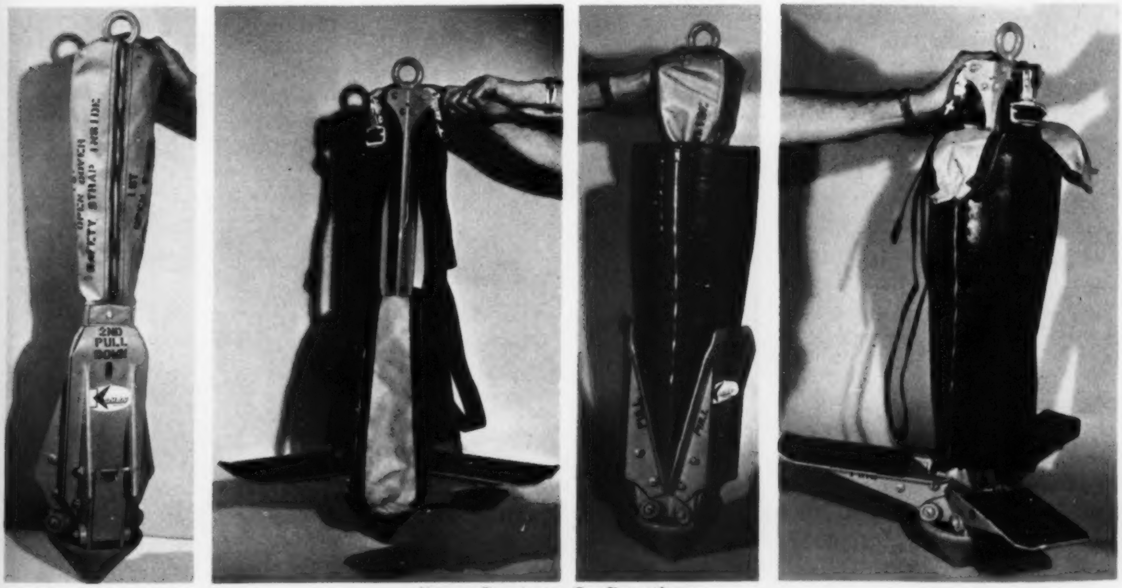
Within the past three years two new devices have been introduced and will ultimately replace the sling and seat. The primary device for helicopter rescue of survivors will be the Navy two-prong rescue hook in combination with the Kaman penetrator. The Kaman penetrator will be used as a sitting platform in those cases where a V-ring is not available on the survivor's flight gear. The Billy Pugh Rescue Net will be an alternate rescue device and will be used in rescue operations where conditions make its use more advantageous.

Rescue Hook and Kaman Penetrator

The combination of the Navy rescue hook and the Kaman penetrator offers an easy and quick method of picking up a survivor. The cable is lowered with the hook and penetrator together and the survivor merely hooks himself on by the V-ring and is quickly hoisted up into the helicopter. When the survivor does not have a ring to slip onto the hook he spreads the prongs of the penetrator and rides up sitting on them. If a survivor needs help, the rescue crewman can be lowered with the rescue device and then hoisted with the survivor, either by riding up on another prong of the penetrator or by attaching his V-ring to the rescue hook.

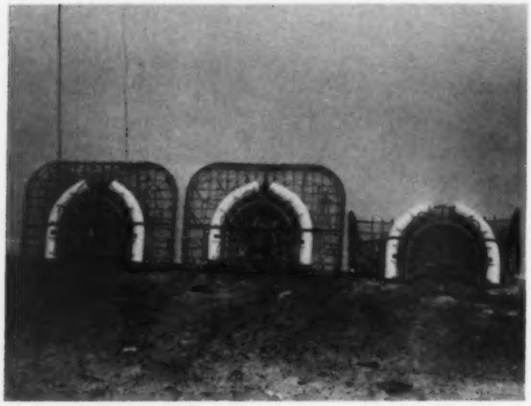
Billy Pugh Rescue Net

The latest of the air rescue devices is the Billy Pugh Rescue Net, the X-872, which is an outgrowth of the Billy Pugh Personnel Transfer Net used on most offshore oil rigs throughout the free world. It is a lightweight (20 pounds) rescue device which is easy to manage in the open or stowed position. It, too, can lift two men simultaneously and is much easier to use in rescuing immobile personnel than the other devices. It does not

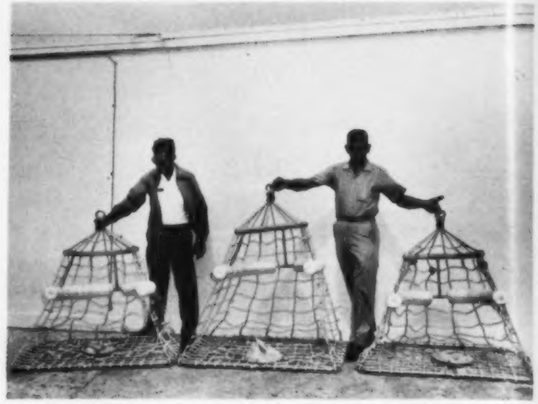


Kaman Penetrator Configurations

First photo, no flotation collar attached, with seats folded and safety straps enclosed within the protective cover. It is lowered to the ground in this configuration. Second photo, no flotation collar attached, safety straps are exposed and seats extended. Third photo, penetrator is in stowed position with flotation collar installed, safety straps within the protective cover and seats folded. Fourth photo, with flotation collar, rigged for rescue with straps exposed and seats extended. It is lowered into the water in this configuration. Minor modifications not shown in these photos have been made to the penetrator.



The X-872, standard net, (left) shown in the folded position. The X-874 (center) is seven inches shorter. The X-873 (right) is also seven inches shorter and has a folding bottom.



The three models are shown in the open position.

easily spin during hoisting operations, it is a non-conductor of static electricity and when used with a sea anchor attached it does not skip off waves. If the hoisting cable jams, the rescuee(s) can be carried safely without any tendency to fall out. NASA considers this net a completely safe pickup device and has directed that it be used to retrieve all of the astronauts after the Apollo flights.

The Billy Pugh Rescue Net was evaluated for NADC (Naval Air Development Center) by several squadrons (HC-1, HC-2, HS-4, HS-8 and Marine Helicopter Training Group 30) during a three-month period in the fall of 1967. Three helicopter models were used in the test and evaluation program. The evaluations consisted of day and night water and land rescues, personnel transfers and light cargo transfers. The purpose was to determine whether the rescue net could replace the sling and seat and to determine whether rescue time could be reduced for mobile and immobile personnel. A few of the comments by the squadrons conducting the test and evaluation program are as follows:

- (H-2 aircraft) – "Personnel and cargo may be safely and quickly loaded/unloaded at the cabin door. Water entry and towing action in light seas is excellent. Rescuees (land) can board the net more quickly than with other devices and a greater degree of safety is afforded. A scooping rescue of an immobile person in water can be made *but it is difficult.* A faster method is just to lower the net with a crewman inside to pull the immobile person into the net. No-hover pickups, after considerable practice, can be made at ground speeds up to 20 knots if the terrain is clear and level. There seems to be no reason why the net can't be maintained at the squadron level."
- (H-34 aircraft) – "The net would be difficult to

The rescuee sits comfortably and safely in the net.

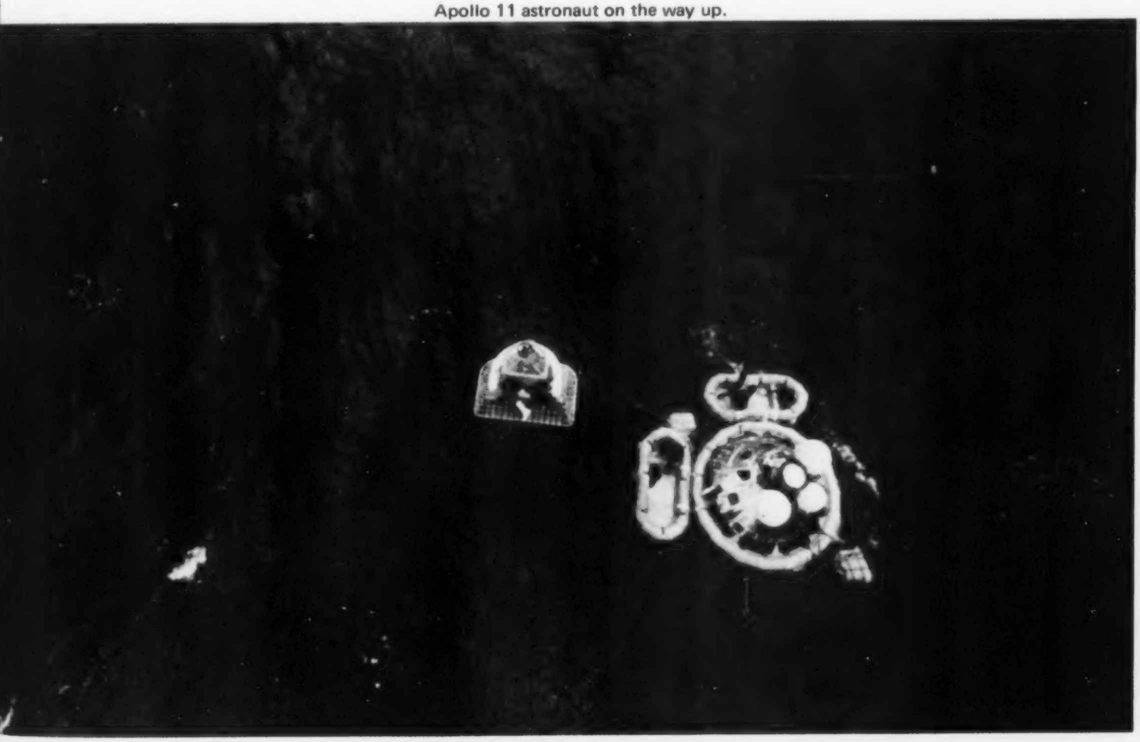
handle if all passenger seats were occupied. The net is compatible with the cabin entrance but if the step is installed the hoisting cable can become fouled and shear. The security of the rescuee in the net was far superior to the rescue seat or sling. Over-land (beach) pickups were made with excellent results between 5-25 knots ground speed. There was no apparent damage to the net from abrasion after 25 land pickups."

• (H-3 aircraft) – "In all instances the net proved to be far superior to the standard sling. Pickups were made in half the time required for rescues with the sling. Significant improvements in rescue techniques were noted. e.g. since the rescue crewman can ride down in the net he simply has to pull an injured man into the net; the design allows the crewman to use both hands in bringing the survivor aboard. A survivor can grab the net and pull himself in without leaving his raft and getting into the water. *(This is not recommended however, since rotor wash may blow the raft all over the ocean.)* With flotation gear on there was adequate room in the net to pick up two people at one time. During an actual SAR mission the net was utilized in the movement of search party personnel into nearly inaccessible mountain areas. Personnel and cargo transfers were conducted easily and safely on a destroyer fantail. Transfers were conducted to a submarine with the same results. All personnel were at ease and safer in the net than in the sling. The net was successfully evaluated in picking up two UDT swimmers simultaneously for transfer to a small boat. Due to the shape of the seat and angle of seat floor it is virtually impossible to fall out of the net. Pickup of an unconscious person is relatively easy. After only one or two practice approaches pilots and crewmen were able to pick up an immobile person in approximately the same time as a mobile person." *(Caution must be exercised when using the rescue net for personnel transfers to or from any solid surface to preclude any possibility of bumping the rescuee's rump. It would be easy to cause a compression fracture of the spine if a rescuee were dropped, even a few inches, because when sitting in the net there is no protection for the tailbone.)*

Extensive use by the fleet for the past two years has proven that the new generation of air rescue devices are superior to the older devices. Check with the local survival gear experts in your command to insure that you know what devices are in use in the area in which you fly and that you are familiar with their operation.

(Information in this article concerning the primary and alternate helicopter rescue devices and phase-out of the sling and seat was taken from a joint letter (Dec. 1969) by ComNavAirSysCom to ComNavAirLant/Pac.)

Apollo 11 astronaut on the way up.



Altimeter Error

DURING cyclic night carrier operations a crew manned a KA-3B that had experienced repeated APN-22 radar altimeter discrepancies. This crew had flown the same aircraft on an earlier day mission and had written up one of the gripes on the radar altimeter. The pilot, therefore, was aware that the APN-22 was unreliable but was not aware that since his last flight the MC-2 pressure altimeter had been removed and a new one installed.

Pretakeoff check lists were completed, including a check of the barometric pressure altimeter setting. The foot pointer was indicating 80 feet which appeared to be correct since the flight deck elevation was also approximately 80 feet. The pilot also noted that the barometric pressure reading in the window was correct, however, he does not recall positively checking the thousand foot counters in the window for a reading of zero.

The aircraft was launched on a case III departure with a 1200 foot ceiling and multiple layers to 8000 feet. During the subsequent flight, numerous rendezvous' with other aircraft were completed, each followed by an aerial refueling. None of the receiving aircraft informed the KA-3B pilot that he was not flying at the prebriefed altitude.

Recovery was delayed several times because of deck problems and eventually the KA-3B was bingoed to a nearby Air Force Base with a field elevation of nine feet. The field was technically VFR but there was a ceiling at about 1200 feet.

The aircraft descended to 1500 feet, as cleared, and turned on final while still in instrument flight conditions. Upon commencing a descent on the glide slope, the controller advised the pilot that he was "well above glide slope." The pilot increased his rate of descent to 1000 feet per minute but continued to receive advice that he was above glide slope. The pilot noted an altimeter reading of 300 feet while still four miles from the runway. About this time he went

contact and a look at the VASI lights verified that he *was* above the glide slope as GCA had advised. It was also obvious that he was considerably higher than the 300 feet which his altimeter was indicating.

The pilot continued the approach visually and the altimeter continued to unwind, stopping at 990 feet below sea level as the aircraft touched down. A subsequent investigation into the installation and calibration procedures used during replacement of the MC-2 altimeter revealed that correct steps were taken – up to a point. After setting the correct barometric pressure, the foot pointer was rotated in the wrong direction when the 80 foot setting was made. This no doubt resulted in an incorrect reading in the thousand foot counter window – a fact which was apparently overlooked by the pilot during his pretakeoff checks.

Anymouse

A 990 foot error in an altimeter, whether it reads high or low, could have serious consequences. In this case, it could easily have resulted in a missed approach. In less favorable circumstances it might well have resulted in the loss of an aircraft and crew. This incident illustrates that all hands connected with flight operations or aircraft maintenance must be alert and use care in performance of all duties, even though the necessity may not be readily apparent at the time.

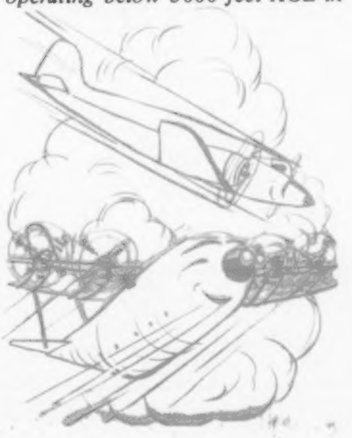
Did You See That?

A C-117 was descending under positive radar control in CAVU conditions. Radar had the C-117 on both primary and secondary radar. A C-130, unseen by the C-117 crew and undetected by the radar operator, passed under the C-117 from the 8 o'clock position to the 1 o'clock position at a vertical distance of 500 feet or less. There was no evasive action by the C-117 because the near miss was over before any action could be taken. The C-130 crew was unaware of the situation until contacted by the tower after the incident.

Perhaps we all become too complacent when we hear the words, "Radar contact, bearing . . . . , distance . . . . , descend to and maintain . . ." From then on we forget our eyeballs and rely on the big electronic eye. If the C-117 had been instructed to start descending 30 seconds earlier, who knows . . . This might have been an AAR instead of an Anymouse.

ASO

OOOEEEYIII! This is a prime example of "things we can do without." Two recent articles in APPROACH, "FAA Report of Near Mid-Air Collision Study" in the Oct 1969 issue and "You Never Fly Alone" in the Nov 1969 issue, address the problems of air space congestion in high density areas and if there is one thing certain it is that nearly all of our Naval Air Stations are in high density areas. Our limited airspace is daily becoming more congested. Every pilot must realize that flying without a proper lookout is equivalent to playing Russian roulette, especially when operating below 5000 feet AGL in terminal areas. Keep your head out of the cockpit and on a swivel, especially if yours is a single-piloted aircraft and your eyes are the only pair available for looking out. If you are piloting a multi-seat aircraft, keep all available crewmembers looking out too! The stakes are simply too high to be remiss in this all-important job.



Sharing Experiences

A FEW months ago, during a night cat shot in an A-4, the radar scope came out in my lap and caused two lacerations on my right hand. My initial thought was to eject but I then realized the airplane was flying all right and an ejection might cause the loss of my right leg due to the position of the scope. After gaining some altitude I was able to maneuver the scope enough to permit a successful recovery back aboard. Inspection of the cockpit showed that the scope retaining clamps were missing and I could not recall checking for their presence during my preflight inspection. This incident was not reported.

Recently, I read where a similar occurrence resulted in an aircraft accident, although in the latter instance the pilot reported seeing the clamps in position during preflight. Had my squadron reported the incident, perhaps an increased awareness of the need for thoroughly checking radar scope mountings could have prevented loss of another Navy aircraft.

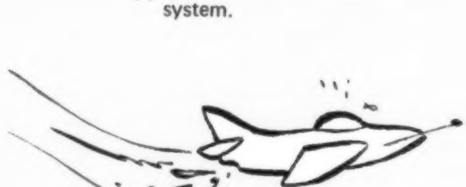
Anymouse

We are hard-put to come up with any better example of the value of sharing our experiences with others. This is the basic reason for the existence of the NATOPS program, Anymouse reports and the Naval Safety Center.

Aviation

Collective Pitch

Russian trying to promote the Soviet farm system.



Touch and Go

What they call it when CAG bolters.

Gear Down and Locked

A legal disclaimer made by a pilot to absolve himself of all blame prior to landing with gear up and locked.

Hyd flap

A heated ussio Hydrographic ffice.

A device for loc the sh to the nearest thun orm.

on Glossary

Hy flap

heated d ussion in the
rographic ffice.

A F

or loca the shortest distance
t thun orm.

Yield Point

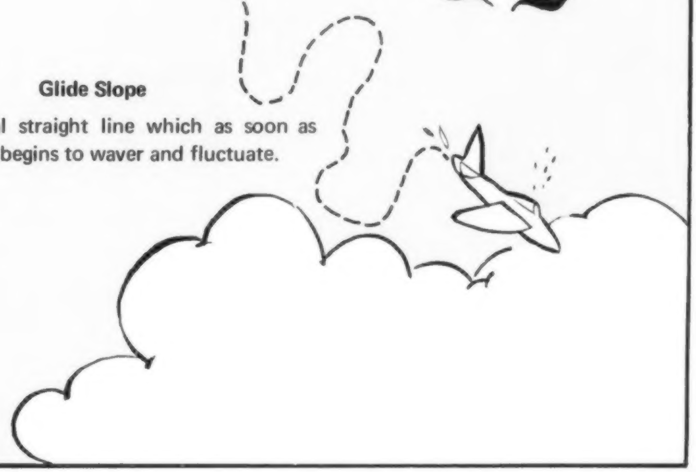
The point at which she stops resisting and begins assisting.

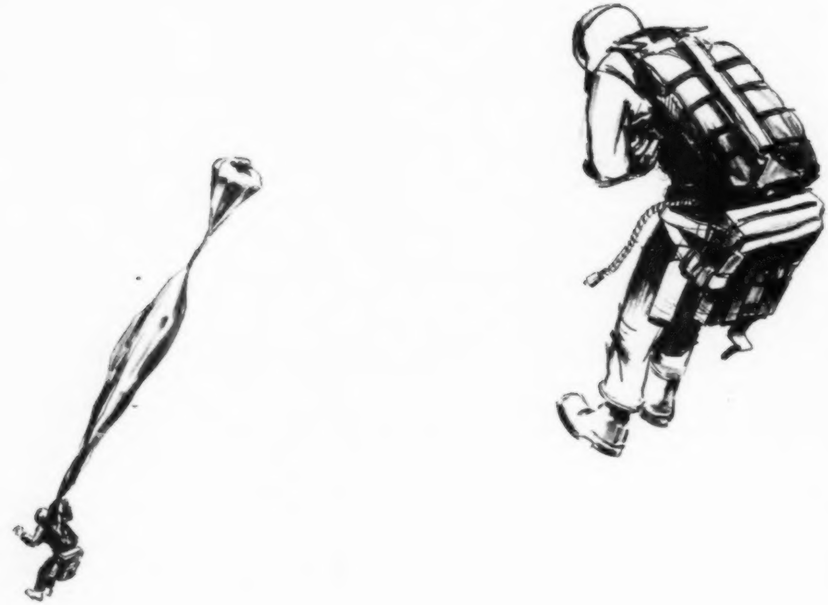
Pressurization

A system for rapidly pulsating cockpit pressure to flex the eardrums and induce nausea and vertigo.

Glide Slope

A mythical straight line which as soon as you get on it, begins to waver and fluctuate.





From the Belly of the Whale

AN RA-3B on a logistics/passenger flight experienced double engine failure, suspected to have been the result of a fuel system malfunction. While the pilot performed NATOPS relight procedures, the P/N (photo-navigator) transmitted Mayday calls. Relight attempts were unsuccessful and the pilot ordered bailout as the *Skywarrior* passed through 10,000 feet over heavily wooded, hilly terrain in hostile territory.

An enlisted passenger was the first to exit, followed by a civilian contractor tech rep, the P/N and finally the pilot. Both the enlisted man and the P/N landed safely on the ground but the parachutes of the tech rep and the pilot caught in tall trees. The tech rep, who was only about 12 feet above ground, managed to swing over to the tree trunk, wrap his legs around it, unhook his harness and slide safely to the ground. The pilot, however, was suspended 30 feet above rocky terrain. He could not reach the tree trunk and there were no large trees near enough for him to swing to. For the better part of an hour he hung suspended in his torso harness until, unable to stand the pressure any longer, he swung to a small tree nearby and released his koch fittings. The tree bent under his weight and he fell through the branches to the rocky ground, suffering a broken left ankle and a sprained right one.

The P/N's pre-bailout Mayday calls had initiated an extensive SAR effort and within a few hours the four survivors were located and rescued. Only the P/N and the pilot had two-way survival radios. The SAR report states that the pilot came up on guard but because he was in a deep valley, radio contact was limited to those times when search aircraft passed by one end of the valley. The tech rep's URT-33 beacon attracted rescue aircraft to his position and the enlisted man was sighted visually.

The P/N's narrative of his bailout and survival experience conveys his feelings as he waited in hostile territory for rescue. We pick up his story as the crew prepares to bail out.

"We seemed to be losing altitude much too fast," he begins . . . "By this time the pilot had ordered us to prepare for bailout. When I put on my oxygen mask I lost ICS and UHF capability so the pilot transmitted the final Mayday with our bailout intentions and stated that four persons were involved. I finally disconnected my oxygen mask and resumed use of my boom mike so that I could continue to communicate with the crew.

"At about 12,000 feet the pilot attempted one final simultaneous relight of both engines with no success. He called for me to blow the door open. I also vaguely remember transmitting a last message that we were passing 10,000 feet and preparing to bail out. The pilot then yelled over the horrendous noise of the RAT and

the open hatch to 'remember to pull your D-rings.' I released my seat pan and parachute and pulled my green apple (emergency oxygen release), lowered my visor and turned to watch the tech rep and enlisted passenger go. The enlisted man hesitated but on seeing our gestures, simply fell forward out of the hatch. He hit his forehead with tremendous force on the lower escape chute but his helmet was apparently well-secured and protected him. I was very concerned about his baro-release system and was quite relieved to see his parachute open after I bailed out."

(NATOPS calls for bailout from the RA-3B to be made feet first, facing aft, legs together, arms tight to the body and head turned to the side. Hands should grasp the torso harness at the D-ring. – Ed.)

This was the enlisted man's first flight in an A-3. When the emergency arose, the tech rep, a former Marine with more than 200 hours as a passenger in A-3s, had rechecked the enlisted man's equipment and had seen to it that his baro-release was hooked up. Investigators say the tech rep may very well have saved the enlisted man's life.

"Before I followed the tech rep out, I tapped the pilot on the shoulder and motioned for him to be sure to follow as he was very occupied with flying the aircraft," the P/N continues.

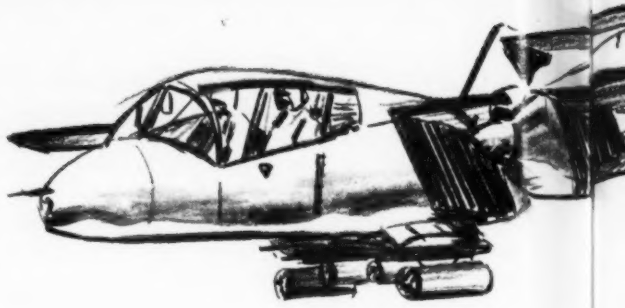
"Once out of the escape chute, I experienced extensive tumbling and disorientation. My hand was positioned to pull the D-ring once I stopped tumbling but that was not necessary since the parachute blossomed almost immediately with a violent jolt. Although I had cinched up my chin strap tightly before I jumped, my

helmet was almost ripped off by the sudden jarring. Oddly enough my glasses remained on and intact during bailout. My oxygen mask was still connected on one side but was flapping in my face so I disconnected it and let it dangle from my seat pan. I experienced no discomfort or pain from the new torso harness which had been issued to me two days earlier and, fortunately, was much tighter than my old 'comfortable' one. Although I had difficulty seeing anywhere except straight ahead because parachute risers restricted movement of my head, I managed to see two chutes behind me and also the descending aircraft. I never did see the pilot's chute.

"The weather was about 2,000 feet overcast so I had little time to orient myself during descent. Actually, the ride down was quite enjoyable; in fact, it was the most pleasant aspect of the whole thing except for seeing the *Jolly Greens* overhead later. Once out of the clag I noticed that the immediate area was quite hilly and densely forested with a river to the north. I prepared for a tree landing but had no idea how tall the trees were. I made sure my visor was down and secure, folded my arms across my face and put my heels and legs together, slightly relaxed.

"I penetrated the trees with no problem or serious injury and made it all the way to the ground, my chute cushioned my fall by hanging up in the tree tops. Once on deck I unhooked my chute and seat pan and checked myself over for any injury. Finding myself intact, I took a drink of water from one of the bottles in my survival vest and turned on my PRC-90. Nothing happened so I took out the battery, checked it for damage and cleaned the corrosion from inside the battery compartment with my shroud cutter knife. When I put it back together it seemed to work fine so I alternated between using the beeper briefly and listening for a couple of minutes. I received no response on the radio so I decided to turn it off, sit down and survey the situation.

"My first reaction to the area was complete disorientation. I broke out the compass from my survival gear and was able to determine north, south, east and west but the dense forest precluded any attempt to join up with the rest of the crew. I was discouraged to see that lack of thick underbrush ruled out any good area for concealment. Although the forest was tall, dense and fairly difficult to traverse, you could see through it for about 50 to 100 yards. Consequently my biggest concern was being quiet. I became extremely alert for any noises, so I used the earphone to listen to the PRC-90. Within 15 minutes of my landing, an aircraft passed directly overhead at a very low altitude. I was elated at hearing an aircraft so soon but was unable to raise him on my radio and he left the area as fast as he had arrived. Also I was so slow in preparing a pencil flare



that he had disappeared by the time I was ready to use it.

I was having no luck with the radio so I decided to move further up the side of the hill I had landed on to improve radio reception. I remembered that most rescues were effected within the first few hours after bailout so I specifically kept all my flight and survival gear on. I figured that the hoist ring on my torso harness might be of value for a helo pickup and I found it easier to wear the survival vest than to carry it. Also the gear provided good protection when moving through the forest and afforded an encouraging sense of security. I wore my gloves, carried my helmet and moved about 75 to 100 yards up the hill south from my chute. Then I settled down to listen, watch and use my radio. Since no one was calling us on guard, I figured that the SAR forces were not in the area yet so I used the radio only intermittently. I looked at my watch and remarked to myself how fast the time was passing – we had bailed out about noon and it was already 1400.

"After sitting there awhile, I heard a call for us on guard. I answered but apparently wasn't heard so I had to be content with listening to the SAR efforts. Soon the controller had a search aircraft in the area which appeared to be working within about a 2-3 mile radius of my position. I could hear his engine once in a while. From the radio conversation he apparently had intermittent contact with the pilot. Once I felt the search aircraft near enough to see a signal, I fired my pencil flare, which I had kept in readiness. I almost jumped out of my skin – I had not expected it to sound like a small cannon so I not only nearly scared myself to death but I figured I might have attracted the wrong people's attention. I was still having no successs with the radio so I continued to move higher up the side of the hill. As I was moving up the hill, a green H-34 went overhead and provided some encouragement to my jittery nerves.

"I finally found a small clearing, actually just a good-sized hole in the tree tops, and decided to settle down again. By this time there were two OV-10s and two A-1s orbiting low and two A-4s on top with the coordinator for the entire SAR effort. I heard from the various conversations on the radio that the *Jolly Greens* were on their way and would be here soon. But I also heard that the pilot had broken his leg. I tried to contact the search aircraft to find out the pilot's position and condition so I might be able to help but could get no one to answer.

"The OV-l0s and A-1s kept making low passes over the area and the first search aircraft to arrive finally established an orbit directly over my position. It was

only when he had arrived overhead that I was able to establish radio contact. He was actually orbiting my chute as a reference but through radio communication I positioned him so he spotted me visually. I had used more pencil flares to get his attention but apparently he did not see them. Once he had me in sight he confirmed that the *Jolly Greens* would be there in about 10 to 15 minutes and told me to sit tight. I told him I was not injured so he said they would be taking the pilot out first.

"About 1530 I heard on the radio that the helos had arrived and were extracting the pilot. The search aircraft told me to get a smoke flare ready because the helo was on its way to get me. I never heard the helo until he was practically on top of me. I could see the debris flying about from his rotor wash but he was still hidden from my sight. On his first pass he went right by me so I popped my smoke flare and tried to position him by radio. There was too much noise to communicate via radio so I secured it and popped my second flare. It was a dud but he had spotted me anyway so I donned my helmet, put down the visor and waited for the penetrator. When it was lowered to me, I quickly read the directions, got on, strapped in, gave a thumbs up and did not let go until I was completely and safely inside the helo. Once inside, I checked on the pilot. He was in quite a bit of pain but otherwise in good spirits.

"I cannot praise enough the pilot's professionalism throughout the entire incident. His cool head, quick action and thorough attempt to recover from the dual flameout instilled in the crew the confidence and determination necessary to cope with the emergency and bailout in a level-headed manner. The civilian tech rep also deserves laudatory recognition for his thorough flight brief of the enlisted passenger which, as far as I am concerned, saved his life."

Many things came out of this accident investigation. The board stated that the pilot's experience points to the need for a lowering device for descending to the ground from trees and that all flight crews in SEAsia should attend JEST (Jungle Environmental Survival Training) School at Cubi Point. The board suggested that while a shortage of PRC-90 radios exists, the older but still effective PRC-63's should be used to augment stocks on hand.

Uncovered in the investigation was the practice of regularly flying fourth seat passengers without seat pans during overland flights. With no seat pan the passenger is deprived of his liferaft and URT-33 emergency locator beacon. The reason given for this practice is that the seat pan is awkward and uncomfortable. "This is not considered sufficient justification," the board states, "and it is strongly suggested that the fourth seat pan be installed whenever the seat is to be occupied."

Both board and SAR personnel praised the RA-3B crew.

"The survivors remained calm under extreme pressure and, in the case of the pilot, painful injuries," the SAR report states. "They materially aided their own rescue by maintaining crew discipline and following SAR instructions promptly and accurately."

"The entire crew performed in a most professional manner," the Board stated, "and their actions were largely responsible for the successful controlled bailout and subsequent rescue."

Safety Center Comments

At the present time, NADC (Naval Air Development Center) is evaluating a lowering device for just such situations as the pilot found himself faced with. The device consists of 200 feet of small wire cable and measures 2-1/2 inches x 2-1/2 inches x 4 inches and weighs 2 pounds. It operates with a disc type braking assembly controlled by a thumb screw and will be carried in the SV-2A survival vest.

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APPROACH takes pride in paying tribute to units and individuals who make particularly noteworthy contributions to READINESS THROUGH SAFETY in Naval and Marine aviation.

Marine Medium Helicopter Squadron 365

MARINE Medium Helicopter Squadron 365 was formed at MCAS Santa Ana on 1 July 1963 as part of Marine Air Group 36, Third Marine Air Wing. The squadron was assigned H-34 aircraft in which it amassed over 28,000 accident free flight hours between May 1964 and the spring of 1967 when the squadron transitioned into the H-46. In the fall of 1964, 365 became part of First Marine Air Wing and one year later was again transferred, this time to Second Marine Air Wing, where they have remained. The squadron has since flown an additional 22,000 accident free flight hours and reached 50,000 accident free hours in December, 1969.

Since its commissioning, the squadron has operated in the Caribbean, Mediterranean and Pacific. It has received the Chief of Naval Operations *Readiness through Safety Award*, the Commandant's *Aviation Efficiency* Trophy, three CNO *Aviation Safety Awards*, the Navy Unit Commendation (for rescue operations after Hurricane Inez in Haiti and the Dominican Republic), numerous Fleet Marine Force Atlantic *Aviation Safety Awards* and the Second Marine Air Wing *Commanding General's Trophy*. Approximately one-third of the enlisted men and over 90 percent of the officers have completed at least one tour of duty in Vietnam. The present Commanding Officer is LTCOL R. H. Nelson.

Somewhere Along J4

CLOUD buildups over South Carolina, one summer evening, must have extended up to about 50,000 feet. A Marine pilot in an F-8 enroute from NAS Dallas to MCAS Cherry Point encountered moderate turbulence near the tops while cruising at FL 450.

"Jacksonville Center this is Marine 760. Can you clear me to FL 470? I'm bouncing around pretty good here at FL 450 and think I can get on top at FL 470."

"Marine 760 this is Jacksonville Center. Climb to and maintain FL 470. Advise height of tops."

"Marine 760. Wilco. Leaving FL 450."

As the pilot advanced the throttle to climb, everything became very quiet. He had an immediate loss of power. (EGT went to zero.) The EPP was deployed and emergency electrical power selected. Quickly he went through the relight procedure – but no joy!

"Jax Center, Marine 760. I've just had a flameout, I'm losing altitude and can't get a relight."

"Marine 760. Roger. Present position is 15 east of Florence.

Shortly after flameout the pilot lost all flight instruments. He was in clouds and turbulence became more severe as he descended.

(Within Jax Center) "Bill, emergency! I have Marine 760 leaving FL 450, 15 miles east of Florence with a flameout. He's in the soup. I need all altitudes cleared below." Within the Center the supervisor alerted the DF net and spread the word to all of the various controllers with traffic in the triangle between Florence, Charleston and Wilmington. Quick action followed.

"Marine 760 this is Jacksonville Center, over."

(On the FSS circuit) "Myrtle Beach, Jax Center. I have Marine 760 with a flameout about 17 east of Florence. What are your flight conditions?"

"We're VFR; 6,000 scattered; 10,000 broken; high broken; visibility 8; winds south at 10 knots; duty runway 17; altimeter 29.96. Is he coming here?"

"I don't know. He doesn't answer me. Guess he's busy."

"Marine 760 this is the Jacksonville Center. Over."

Meanwhile the pilot was trying to keep everything under control, even though the pucker factor was approaching the red line. His already bad situation was being compounded by precipitation and heavy turbulence. He held the stick in neutral and made no attempt to fly (glide) partial panel. He was just interested in maintaining a reasonable, wings-level attitude and holding airspeed. The needle/ball kept pegging in all directions while he descended in solid clouds. Passing through 30,000 feet he was unsuccessful in another relight attempt.

"Marine 760 this is Jax Center. Over."

Finally at 23,000 feet that big, beautiful turbine fired up. Shortly after getting his engine back, the pilot broke out, between layers at 20,000 feet, in a nose-down, 20 degree left turn at 280 kias.

"Jax Center this is Marine 760. I just got a relight and I think everything is OK. Sorry I didn't answer sooner but I've been busy. My present position is the 095 radial 35 miles from the Florence vortac at 20,000 feet, in the clear between layers."

"Marine 760, Jax Center. Roger. Do you still want to go to Cherry Point?"

"Ah, Jax Center. Negative from Marine 760. How 'bout a clearance to Myrtle Beach AFB?"

"Marine 760, Jax Center. Roger. Cleared to Myrtle Beach AFB. Turn right heading 195. Descend to 9,000 feet. Myrtle Beach weather is VFR; 6,000 scattered; 10,000 broken; high broken; visibility 8; winds south at 10; duty runway 17; altimeter 29.96. Contact Myrtle Beach Approach Control when 20 north on 291.0."

"This is Marine 760. Wilco and thanks a lot."

While the pilot completed his letdown and subsequently made a routine landing, Jax Center terminated the emergency procedures for his area. Soon, seven northbound and five southbound aircraft which had either been holding at various fixes or had been vectored away from Marine 760, were released to continue to their destinations.

Marine mechanics were flown to Myrtle Beach from Cherry Point to check out the subject Crusader. No discrepancy was found. It was concluded that fuel control icing in super-cooled cloud tops was the probable cause of the engine flameout. The pilot was commended for his calm handling of the emergency. His decision to fly attitude as best he could, *without instruments,* and to continue relight attempts was sound. He knew his aircraft, he knew his procedures and he knew his own capabilities. (That's stacking the odds the right way.)

While handing out kudos, the help which he received from Jax Center was truly outstanding. The prompt handling of the emergency was the work of real professionals. ◄

notes from your flight surgeon

Mk-1 Life Preserver

A PIECE of personal survival equipment which all flight deck crewmen should be wearing is the Mk-1 flight deck life preserver shown above. This flotation vest (FSN 2H-4220-926-9438 through 9458) comes in three sizes: small, medium and large, and in seven colors to designate various aviation functions. The Mk-1 provides a minimum of 29 pounds of positive buoyancy – enough to make the difference between drowning and surviving should the wearer fall or be blown over the side. The following general discourse on the Mk-1 is provided to facilitate briefing flight deck personnel on this important item of equipment: - -The inflator assembly of the vest contains two small CO_2 cylinders with one actuating lever. To inflate the vest, simply pull down on the lanyard attached to this lever. Don't worry about overinflation, the vest has a flotation chamber relief valve which prevents this from happening.

When donning the Mk-1, be sure to fasten the snaps in front so that the vest will not come off in the water. To "preflight" the vest, inflate it orally to make sure that no leaks have developed since the last time it was worn or checked. Take the oral inflation tube out of its retaining loop and turn down the knurled ring as far as possible. Depress the mouthpiece by force of your mouth or with your hand and inflate the vest orally. Allow the mouthpiece to release after each "blow."

If partial inflation of the Mk-1 does not constitute a hazard to you as you perform your job, you can blow one or two breaths into the vest when you put it on to give you some initial buoyancy should you find yourself in the water. If the vest must be inflated orally in the water, lock the oral inflation valve after inflating by turning the knurled ring up against the mouthpiece.

When the life vest was first developed, the addition of a light and a whistle was considered. However, it was felt that pockets might result in flight deck personnel carrying potential "FOD material" and that a distress light in the shoulder area would be a snagging hazard and would be damaged by the wearer carrying tie-down chains or catapult slings. Instead, light-reflective tape was installed on the shoulder areas of the vest to aid in night pick-ups.

A final word: life vests must be kept away from oil, paint and greasy substances as much as possible since these materials can accelerate deterioration of the fabrics of the vests. Sharp edges of various items about the flight deck are "wear and tear" hazards to be avoided. The CO_2 cylinders must be kept away from heat (steam lines, radiators, laundries, etc).

Wear your Mk-1 life vest in good health! It's life insurance! - -

Further to the above, but not necessarily appropriate to all briefings, the need for signaling equipment on the Mk-1 life vest has been recognized and work is being done to provide this. NASL (Naval Applied Science Laboratory, Annapolis, Md.) is currently developing a new type of distress light compatible with all NavShips life preservers. This is a completely sealed incandescent light with a fresnel lens producing different concentrations of light. It is designed so that it can be activated either automatically or manually and even after automatic activation can be manually controlled. NASL is also investigating a compact

single-tone whistle to be used with the Mk-1 life vest.

Pending formal revision of the specifications covering the Mk-1 life vest, NavShipSysCom (Naval Ship Systems Command) interposes no objections to locally manufactured pocket assemblies on an interim basis to accommodate non-pyrotechnic signaling equipment. One such local modification devised by VA-23 while embarked in ORISKANY was described in *Personal/Survival Equipment Crossfeed 1-70.*

Information on the use and periodic testing of the Mk-1 life vest is contained in Chapter 9331 of the *Naval Ships Technical Manual (NavShips 0901-331-0001).* Excerpts from this chapter appeared in *Personal/Survival Equipment Crossfeed 11-69.*

Lanyards

LOSS of a piece of survival gear or difficulty in retaining it in the water due to the lack of a lanyard is mentioned frequently in aircraft accident survivors' narratives. A recent example was an A-7B pilot who ejected. He removed his strobe light from his SV-2 survival vest and then found the light did not have a retaining lanyard. He was forced to hold the strobe in his hand during the entire rescue phase.

Air Crew Systems Change 162 (concerning the SV-2A survival vest and modification of the SV-2 to the SV-2A configuration) is the current instruction on survival gear lanyards: "Items carried in the vest are secured against bailout windblast and are further secured to the vest itself by means of light nylon cords in such a manner as to prevent inadvertent loss and yet permit use of the item while still secured to the vest." Still-current detailed instructions for lanyards, including a lanyard for the standard .38 cal. revolver, are contained in *Air Crew Systems Bulletin 157.*

If your survival gear is not attached to your survival vest, stop by your squadron parachute loft.

Partial Inflation

AFTER checking a Mk-2 life vest out from the paraloft, a helicopter pilot unscrewed both CO_2 cartridges in accordance with recommended preflight procedures to make sure the seals hadn't been punctured. When he reinstalled the cartridges he failed to seat them completely. You might know – the helo was ditched on this flight. When the pilot pulled the toggles on his mae west, one of the CO_2 cartridges was not punctured and the other leaked CO_2 outside the vest. He orally inflated the center compartment of the vest and a short time later climbed into a raft.

"Thus a careless and incomplete preflight of survival gear could have become a problem for this experienced aviator had a rescue vehicle not been so close at hand," writes the investigating flight surgeon.

When you preflight the CO_2 cartridges in a life vest make sure that the cartridge seals have not been punctured and then be ***absolutely sure*** to screw the cartridges back in their proper places *tightly.*

It's A Gun

BECAUSE a pilot in a survival situation could not load his Mk-79 Mod 0 pen gun fast enough to signal a search aircraft on the first go-round in a survival situation, he now carries the pen gun "loaded but uncocked for quick use" he told investigators.

This is a dangerous practice. Here is an excerpt from *NavWeps Ordnance Publication 2213, 1st revision, Change 17* to refresh the memories of all users of the Mk-79 Mod 0:

"*Safety Precautions.* The following special safety precautions apply:

"(1) Signals in this kit are ignited by percussion primers which must be protected against being struck. Protruding tabs of the bandoleer that extend over signal bases prevent accidental striking of the primers. They must not be torn off or bent back except in loading a signal into the projector.

"(2) The projector must not be loaded until immediately before firing. If a signal is loaded into the projector and not fired immediately, it must be returned to the bandoleer.

"(3) Signals must be inspected periodically to assure that they are not dented or otherwise damaged.

WARNING

Dented or damaged signals shall not be used. Dents or other imperfections might result in violent action of the signal when fired.

"(4) Signals must be kept away from fire and other heat sources.

"(5) The projector trigger screw must be checked frequently to assure that it is tight. A loose trigger can release the firing pin prematurely and cause injury or it might fall out and be lost during emergency loading, thereby making the projector useless.

"(6) The trigger screw must be in the safety slot while a signal is being loaded.

"(7) In firing the projector, care must be taken to raise the arm well above the head with the projector held in a vertical position. A loaded projector must never be pointed toward other personnel or toward the body of the user."

Remember, the Mk-79 Mod 0 is a gun and should be treated with the same respect with which you treat your .38 cal. revolver.

WHO'S TO BLAME?

THE aircraft was being taxied to the catapult at night and was being directed through a tight space between two parked aircraft. The pilot felt that there was insufficient clearance and informed Pri-Fly by radio. When the plane director continued to give taxi signals, the pilot assumed that it had been determined that the clearance was adequate and continued taxiing, smartly crunching one of the parked aircraft.

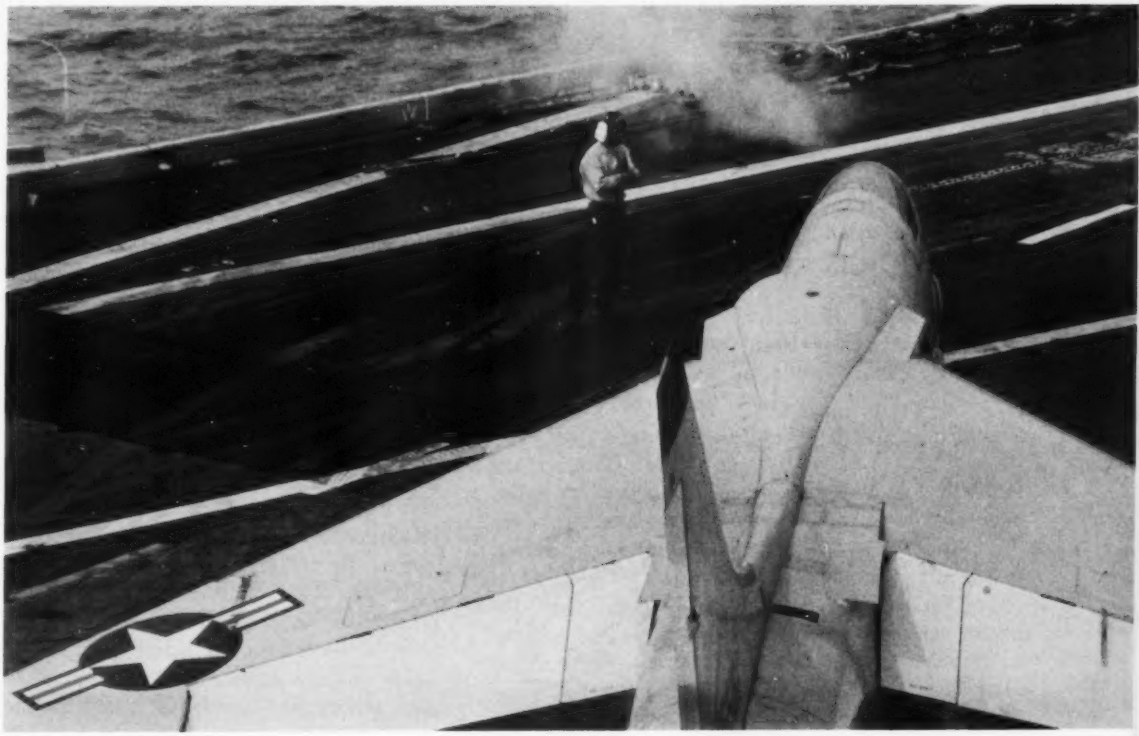
The CVA/CVS NATOPS Manual states: "All taxi signals shall be answered promptly and accurately unless the pilot considers that there is a dangerous situation existing or developing in which case he shall stop." Although the pilot is responsible for the control of his aircraft, it is the director's responsibility to ensure that the intended taxi area is clear and offers sufficient space. In many cases the pilot is forced to rely entirely upon the judgment of the director in maneuvering an aircraft in close quarters.

Who was at fault?

Anymouse

• This is a tough question which can be fully answered only by those on the scene who have access to all the facts and a clear understanding of all the surrounding circumstances. We believe that a discussion of this question, which has been adapted from an article in the Royal New Zealand Air Force publication, "Flight Safety," is pertinent and goes a long way toward providing an answer.

WHO IS RESPONSIBLE?



IN THIS modern age when we have aircraft of great size and weight, with cockpits positioned ahead of the nosewheel, sweptback wings and limited pilot visibility, it would be logical to expect that the art of taxi direction would have progressed along with aircraft developments. Unfortunately, this is not so. We still have to rely upon an antiquated sort of modified semaphore. Until someone comes along with a better system, we still have the problem of division of responsibility between the taxi director and the pilot.

In taxi accidents where the services of taxi directors are involved, the question invariably arises:

Who is responsible, the pilot or the taxi director?

The pilot must always accept primary responsibility for the safety of his aircraft. He has ultimate control over the motion of his aircraft – something which the taxi director has not. He is also responsible for continuously assessing the acceptability of guidance given by the director. However, placing the primary responsibility on the pilot does not mean that directors can be allowed to direct aircraft into brick walls. On the contrary, *they must accept responsibility for the accuracy and adequacy of the guidance which they are required to give*. In failing to recognize danger and give positive warning in time to prevent collision, they fail in the support which they are required to provide.

We must be careful that we do not make the word responsibility synonymous with blame. In modern aircraft the assumption that the pilot is to blame for a taxi accident simply is not always valid. In some aircraft a large part of the aircraft is outside the plane crew's visual field. Moreover, once the pilot is strapped in, it is simply not practicable for him to get out and look every time he cannot personally satisfy himself that his aircraft is clear of all obstructions. He must, in practice, rely on taxi directors who are not under his control. If one of these qualified people falls down on his job, it is unfair to blame the pilot.

In short, the pilot's inherent responsibility in no way lessens the responsibility placed upon the taxi director. Should the director fail to exercise that responsibility he must also be held to blame. Moreover, it is conceivable that on occasion his error will be considered as the primary cause factor in an aircraft ground mishap.

WHAT IS IT? How will it affect the Navy (meaning you) in the future? Oversimplified, systems safety engineering is a recently developed management tool for ensuring that safety becomes a watch word in the very earliest design stages of all Department of Defense weapons and weapon systems and that maximum safety is built into all such systems of the future. The concept is now being employed at an ever accelerating pace in the procurement of new weapon systems and related equipment; the purpose is to eliminate or minimize personnel hazards and material failures/malfunctions throughout the life cycle of the material affected. Thus, the long range effect will be the reduction of accidental loss of life and material in the military services . . . something to be hoped for by everyone associated in any way with service life.

Background

As early as the mid 50's, with the spiraling cost of material and the tragedies of unnecessary loss of life in avoidable accidents as a back drop, it became evident that a new approach and added emphasis to accident prevention, safety education and accumulation of safety data in the military services was needed. During these years the Naval Aviation Safety Center at Norfolk proved the value of centralized attention to aviation accident prevention. In recent years a broader based safety program embracing air, subsurface, surface and shore aspects, and founded on the relative success of the Naval Aviation safety efforts, was established by the Secretary of the Navy and called the Department of the Navy Safety Program. The Chief of Naval Operations and the Commandant of the Marine Corps were delegated responsibility for implementing and directing their respective parts of the program.

System Safety Engineering

As part of the implementation process, the Chief of Naval Operations assigned certain tasks with respect to safety in hardware design and procurement to the Chief of Naval Material. It is in this area that systems safety engineering has emerged in the Navy as a governing concept, since Chief of Naval Material responsibilities relating to safety include steps to:

- Insure that safety precautions are prepared, issued and kept current for all equipment, weapons or weapon systems, materials, supplies and facilities which are acquired, constructed or provided by the Naval Material Command. Whenever practicable, these safety precautions are to be directly related to their subject

matter by incorporation into appropriate technical manuals and publications.

- Insure that safety is given maximum consideration in the design and engineering of all ships and aircraft, weapons and weapon systems, equipment, materials, supplies and facilities which are acquired, constructed or provided by the Naval Material Command. In so doing, insure systems safety engineering and management principles outlined in Military Standard 882 (see below for explanation) are applied to the above.

While these steps were being taken the Chief of Naval Operations assigned an expanded mission and broader tasks to the old Naval Aviation Safety Center and changed its name to the Naval Safety Center, the objective being to continue to promote safety in Naval Aviation while assisting in a parallel way in enhancing safety in other categories of Naval procurement and operations. Among the tasks of the Naval Safety Center one in particular is important, both directly and indirectly, to the subject of systems safety engineering in the field of aviation. It is to initiate and conduct independent investigations and analyses into all phases of safety to develop information and make recommendations for the formulation or modification of policies, practices or hardware as statistics and information available indicates to maintain the highest practical level of operational safety consistent with maximum combat readiness.

Contract Item

Insofar as Systems Safety Engineering in the field of aviation is concerned, the USAF led the way with the promulgation in 1963 of a related specification (Mil-S-38130) for use in its own development and procurement. This effort captured the imagination of the OSD (Office of Secretary of Defense) and in 1966 a revised but similar DoD specification (Mil-S-38130A) was issued for guidance of all the services. This military specification is used by the Air Force on the Minuteman III, C-5A and F-15 contracts as a specific contract item and the Navy has incorporated it in the S-3 contract. Although it is not a specific part of the F-14 contract, Grumman, proud of its ability to insure overall weapon system effectiveness without compromising safety, has developed a system safety plan along the lines required by Mil-S-38130A. A brand new Military Standard 882, less than six months old, has now replaced Mil-S-38130A and undoubtedly will be incorporated in contracts for future DoD buys.

Specifically What

The system safety engineering specification establishes general requirements for contractors to apply system safety engineering principles from conception throughout design, engineering, fabrication, test, installation, checkout, operations, modernization and retrofit. The specification defines the essential safety engineering program for systems, associated subsystems and equipment to assure maximum safety consistent with operational requirements. The purpose, of course, is to design safety into the weapon or weapon system and set up controls over anything hazardous to people, equipment or property. Prime contractors are charged with production of a system safety engineering plan and also for integrated management of the entire program including work done by subcontractors. Within house, the prime contractor's system safety personnel are required to participate in all tradeoff studies, work studies, system interfaces and system analyses. The military specification establishes four classes of hazardous conditions as follows:

Class I – SAFE. Condition(s) such that personnel error, deficiency/inadequacy of design or subsystem/component malfunction will not result in major system degradation and will not produce system functional damage or personnel injury.

Class II – MARGINAL. Condition(s) such that personnel error, deficiency/inadequacy of design or subsystem/component malfunction will degrade system performance but which can be counteracted or controlled without major damage or any injury to personnel.

Class III – CRITICAL. Condition(s) such that personnel error, deficiency/inadequacy of design or subsystem/component malfunction will degrade system performance by personnel injury or substantial damage or will result in a hazard requiring immediate corrective action for personnel or system survival.

Class IV – CATASTROPHIC. Condition(s) such that personnel error, deficiency/inadequacy of design or subsystem/component malfunction will severely degrade system performance and cause subsequent system loss or death or multiple injuries to personnel.

These classifications have been established in order to identify conditions within systems or subsystems so that meaningful decisions can be made concerning system redundancies, performance, weight and cost, among other considerations.

S-3 Contract

Parts of the SSEP (system safety engineering plan) developed by Lockheed-California for the S-3 contract are used to illustrate this concept. Specific elements of the plan are:

Continued

• Detailed design safety requirements will be established.

• Design reviews conducted during the program will be closely monitored by safety engineering personnel. Contractor/NavAir safety reviews will be conducted as part of the overall program reviews. Additional NavAir/contractor ad hoc safety reviews shall be convened by either NavAir or the contractor as conditions warrant.

• Failure modes and effects analyses will be conducted to evaluate the system and associated subsystems and to identify potential hazards that require corrective action.

• Design of components and personnel stations will be carefully examined for crew suitability.

• Human factors, evident in many aircraft accidents, will be taken into account in the safety évaluation. The operator's task will be assessed and stress levels for both normal and emergency procedures will then be evaluated.

• Safety design surveillance will be provided through completion of production contracts by reviews of test programs, handbooks, engineering change proposals, Unsatisfactory Reports and incident/accident data.

• Technical assistance will be provided for model safety conferences, NATOPS manual reviews and for contractor accident/incident investigations.

• Safety lectures and reviews will be given to contractor personnel throughout the design, test and operational phases of the contractor's program.

• Ground support equipment will be evaluated to ensure safe usage.

Lockheed established a line organization within the Engineering Branch of the S-3 Project Office. A block diagram of the organization is shown in Fig. 1.

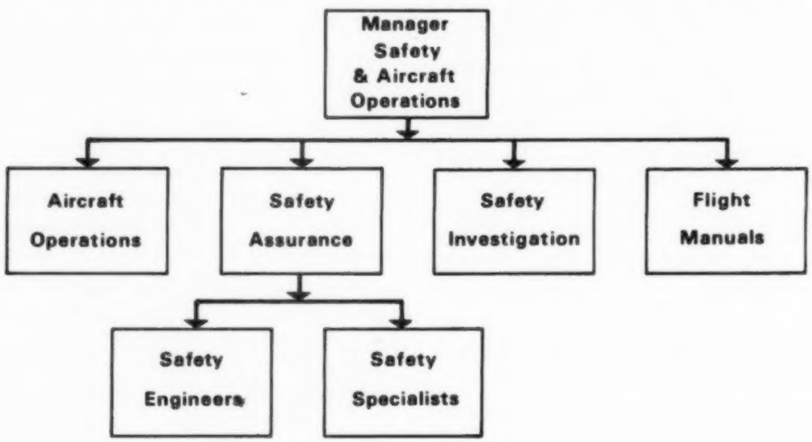


Fig. 1

Further, to ensure that safety considerations remain an important part of the project, a milestone chart has been prepared as a means of tracking the system safety engineering program. A sample milestone chart is shown in Fig. 2.

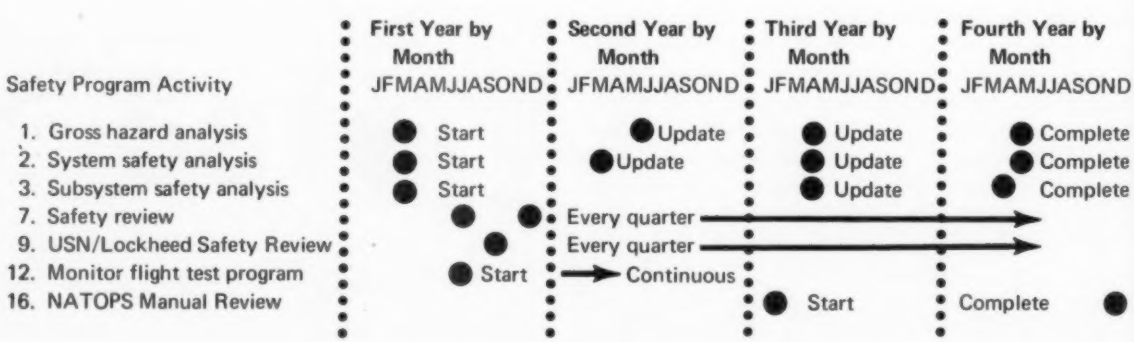


Fig. 2

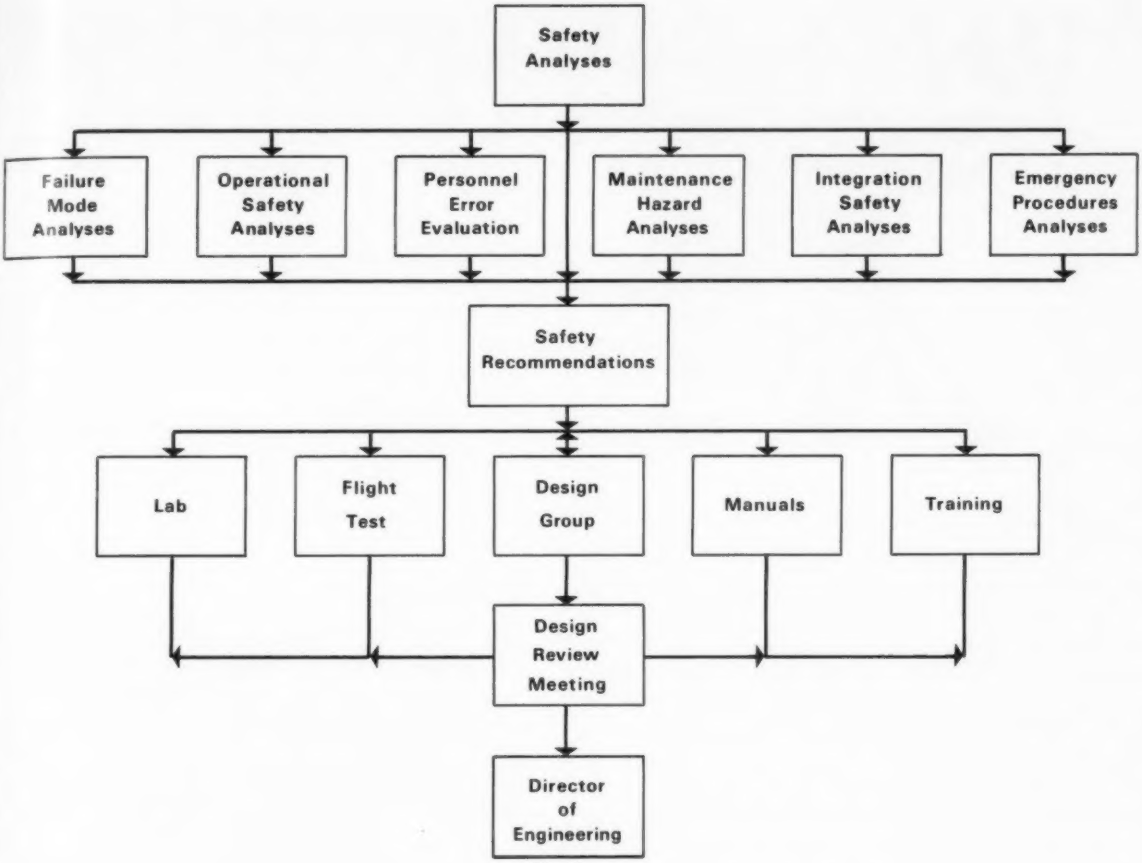


Fig. 3

Sample flow chart showing safety analyses interfaces.

Lockheed management established the safety engineering criteria of a single-mode-failure design philosophy (no single failure will cause an undesired event) – both fail-safe and save-life techniques will be used. Safety engineering criteria will be satisfied in the following order of preference:

• Design for minimum hazard. Maximum effort will be made during all phases of design to insure optimum degree of inherent safety through the selection of proven design features and qualified components and materials.

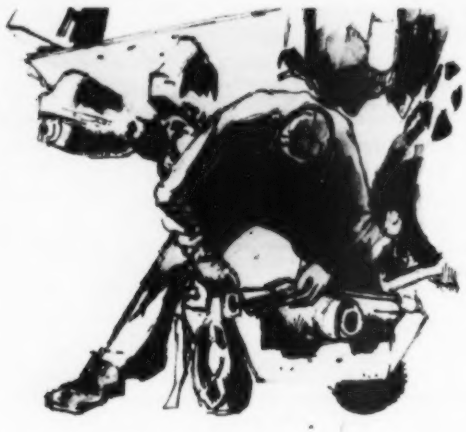
• Safety devices. Known hazards which cannot be eliminated by design selection will be reduced to an acceptable level through the use of suitable safety devices as part of the system, subsystem or equipment.

• Warning devices. For those instances where it is impossible to preclude the occurrence of a known hazardous condition, appropriate devices will be employed to detect the condition and generate a warning signal.

• Emergency procedures. Emergency procedures will be developed for those hazardous conditions which cannot be eliminated by design techniques or where the use of safety and warning devices fails to reduce the magnitude of the hazard to an acceptable level.

Safety engineering qualitative analyses will be conducted consisting of gross hazard studies, a weapon system safety analysis, appropriate subsystem safety analyses, an explosive ordnance analysis and an operational safety analysis. Near and dear to the heart of maintenance personnel, maintenance and servicing hazard analyses will also be conducted. Fig. 3 illustrates how the analyses will be conducted. This will include:

• Safety problems that could occur as the result of maintenance activity will be divided into two major categories: (1) those that could cause death or injury to personnel engaged in maintaining the aircraft; (2) those that create potential hazards to the flight crew and



aircraft as the result of maintenance actions.

Preliminary studies will identify hazardous areas associated with contemplated maintenance activities. These studies will concentrate on maintenance functions that are necessary for the support of the aircraft . . . . particular attention will be paid to those design features and characteristics that have caused trouble on previous systems.

• The potential for such problems as cross-connection of fittings and controls will be examined at the component level during design reviews. Maintenance engineers will assist in the selection of components and in the development of design features that reduce the possibility of improper assembly during maintenance or overhaul. Particular emphasis will be placed on flight control and propulsion components.

• Maintenance actions which could result in serious injury to maintenance personnel will be determined by an independent safety study. Effects of environmental conditions, including inclement weather, high wind, extreme heat and cold and precipitation will be included in the evaluation . . . and will be given full consideration.

Summary

What has been presented in this article is by no means a complete system safety engineering program but is a thumbnail sketch of what the contractors are doing and a brief insight into how they are attacking the problem of increasing systems safety. There is no doubt that when the F-14 and S-3 weapon systems are delivered to the Navy, pilots, aircrewmen and maintenance personnel will benefit immeasurably from this new technique of *designing safety into the weapon system from the earliest stages of design and monitoring all aspects of safety throughout the system's life cycle.*

Maximum safety – that is, the minimization of accidental loss of life and material – will come from a complete understanding of conditions and circumstances which can set the stage for avoidable accidents. This, in turn, will require early recognition of hazardous problem areas and then systematically eliminating them.

Anon.

MURPHY'S LAW*

ORDNANCE MURPHY

THE A-7B pilot was setting up his ordnance switches in preparation for a group strike on a practice target complex. The MASTER ARM switch was OFF, the STATION SELECT switches for the loaded wing stations were on READY and the AWE-1 Automatic Weapons Release System was set on STEP SINGLE. As the AWE-1 QUANTITY SELECT switch was turned on, the entire ordnance load of four Mk-124 inert bombs was salvo ejected. Fortunately, the bombs were observed to impact in an unpopulated area.

Postflight investigation revealed that immediately prior to this launch, the MX-7016/AWE-1 had been changed and aircraft cannon plug P3113 had been inadvertently connected to cannon plug 2J6 on the AWE-1 instead of being connected to the proper plug, 2J2. This provided a 28 v.d.c. power firing impulse to all selected wing stations when the AWE-1 QUANTITY SELECT switch was turned on.

Despite the difference in numbers and arrangements of the pins between cannon plugs P3113 and 2J6, the two mated very easily. This incident could have been avoided if:

- A proper quality assurance inspection had been conducted. Quality assurance inspection on this job consisted only of the inspector ensuring that the cannon plugs were tightly connected.
- A functional test of the Automatic Weapons Release System had been performed upon completion of the job.

* If an aircraft part can be installed incorrectly, someone will install it that way!

Chain of Events

"TEXTBOOK PRECISION" describes the daylight overwater ejection and pickup of an F-4B pilot when starboard and port engine failures occurred in close sequence during bingo to the beach. The RIO's experience was another story. The fact that the oral inflation valve of his Mk-3C life preserver had been packed in the open position precipitated a chain of events which very nearly got out of hand.

"Ejection was normal and the whole sequence progressed perfectly," the RIO begins in his survival narrative. "I had about 4 or 5 seconds in the chute – just enough time before water entry to cage my eyeballs, inflate my Mk-3C and release my left rocket jet fitting. When I surfaced, I heard the sickening sound of CO_2 escaping. The right side of my Mk-3C was deflating rapidly.

"My first impulse was to get my raft inflated before the Mk-3C went flat. I had just opened the seat pan and found the end of the lanyard when the shroud lines pulled me under for the first time. I immediately released my koch fittings but both my feet were already entangled."

As the chute sank the shroud lines gradually pulled and tightened.

"At this point I began to have extreme difficulty just keeping my head above water. Only half of my Mk-3C was inflated, the shroud lines were exerting an increasingly greater force downward and the sea state was fairly heavy.

"Obviously," the RIO understates, "I was in trouble."

He began to shed equipment.

"I got rid of everything possible to gain a little buoyancy – my helmet and oxygen mask, my seat pan, which was still attached to the raft, and my right boot. This helped somewhat. Removing my boot freed my right leg from the shroud lines. I then tried to reach my shroud cutter and my survival knife to free my left leg but all my survival gear had shifted during the ejection and I could not find anything. By this time my efforts to keep my head above water and disentangle myself had nearly exhausted me. I knew that I didn't have much longer before the lines would pull me under for good."

With a surge of adrenalin, the RIO reversed the direction of events. "The realization that the lines were pulling me under for good really angered me," he recalls. "I made one last effort to find my shroud cutter and somehow I did find it. I quickly cut my leg free, blew some air into my anti-G suit hose and blew some more air into the right side oral inflation tube of the Mk-3C. The combination of air in the anti-G suit and the Mk-3C now made it relatively easy to keep my head above water. Soon I saw orange daysmoke which I knew meant the pilot was OK and shortly afterwards I saw a helo heading towards it. I wrestled around with my survival vest, found my PRC-90 and began calling my position to the helo."

The helo made a pass and dropped a swimmer. Pickup followed.

"The performance of the entire helo crew was perfect in all respects," the RIO noted in his final report. "If it were not for their swiftness, precision and professionalism, I don't think I would be here to write about the experience now."

The investigating flight surgeon commented in his report on the RIO's difficulties with his life preserver.

"Inspection of his Mk-3C afterwards showed it to be in fine shape," he wrote. "It was a relatively new life preserver which had been checked and repacked the preceding month and when inflated with new bottles had no leaks. However, the RIO did not have to unscrew the end fitting on the oral inflation tube when he blew it up. From this we can assume that the fitting was not in its proper position when packed.* When the Mk-3C was inflated and then rose up under the RIO's arms after water entry, the valve of the oral inflation tube was pushed down, releasing the CO_2." (A quick check of the rest of the squadron's life vests revealed a number of other oral inflation valves not properly stowed, the flight surgeon reports.)

The pilot's survival and rescue phases went as if he were undergoing refresher training with his equipment in the station swimming pool, the flight surgeon states.

"The pilot performed his necessary tasks extremely well and in the right order and all systems worked as advertised. After discussing his experience, it was evident that he gained much confidence in both his present safety and survival equipment and his ability to act in an emergency. Undoubtedly he is better for the experience.

"The RIO, on the other hand, suffered a less than desirable encounter. I feel his problem began when he chose to focus his attention on staying afloat immediately after water entry instead of releasing his koch fittings. Admittedly his Mk-3C was mispacked and hearing the sound of escaping CO_2 would certainly attract one's attention . . .

"A number of small occurrences compounded his predicament. His inability to reach his shroud cutter and knife was due to their location with respect to the shifting survival vest and obscuration by the inflated Mk-3C bladder . . . Most aviators in a squadron have never had their full regalia on with the Mk-3C inflated in a water environment. The mock drills in the swimming pools are too often done with a hodgepodge of mismatched throwaway gear which satisfies the written requirement but does little for education on details."

Flight surgeon's recommendations:

"• A one-time check of the oral inflation tubes of the Mk-3C for proper stowage of the oral inflation valves is in order by the airman after the gear has been replaced. A total look-see of the contents and arrangement of the survival vest is a good idea too, because after repacking the contents often will be shuffled. Again and again this points to the fact that one's own survival is a personal matter and no one looks out for your safety like you do yourself. Suspicion should be a byword of safety.

"• Inflate the Mk-3C and deploy the seat pan raft during parachute descent and be ready to release the koch fittings when your boots get wet.

"• At the expense of three torso harnesses (one small, one medium, and one large), helmets, nomex flight suits, pairs of flight boots (instead of tennis shoes), survival vests *completely* packed with radios, SEEK kits, etc. – in other words, the full wardrobe of the well-dressed combat-ready aviator – each man could see for himself just how difficult it is to reach a particular piece of survival gear in a water environment. The placement of such gear on the body would vary with each individual, depending on his flotation characteristics, length of arms, torso height, etc. The RIO in this accident had to learn the hard way."

*The two oral inflation valves in the Mk-3C life preserver should be packed in the *locked* position. On the other hand, the single oral inflation valve in the Mk-2 life vest should be packed in the *unlocked* position. NAVAIR 13-1-6.1, Inflatable Survival Equipment Aviation Crew Systems Manual refers.

LETTERS

Pilot Induced Flameouts

NAS Memphis, Tenn. – One day about 15 years ago as a downy cheeked ensign I roared into the break as No. 4 man in a formation of F9F-5 *Panthers*. We were moving out right smart, although I don't recall the speed.

To make a long story short, I inadvertently retarded the throttle beyond the idle detent and crashed.

One of the recommendations of the accident board was to install a device to preclude accidental flameout caused by "coming around the horn." Five years ago I noticed pilots were still inadvertently "coming around the horn" and I wrote an Anymouse.

On a recent *Weekly Summary* (5-11 October) I see ALFA damage to an F-8K due to "suspected pilot inadvertent engine shutdown." The cover text on the *Summary* concerns the purpose of incident reporting and trend analysis and identification.

My questions are these: How many jets have we lost due to this type of inadvertent flameout? And, is anybody working on a device to prevent it?

LCDR M. J. Loso, USNR

• Our information shows three aircraft lost and twelve incidents (F damage) in the past five years as a result of inadverent pilot induced flameouts.

It's not easy for the designer to keep us out of trouble when we exercise the wrong lever, push something out of sequence or pull something too far. It is also impossible to legislate against incorrect cockpit procedures (otherwise inadvertent wheels-up landings would have ceased years ago) but smooth handling of throttles and controls and the use of checklists – every time – will reduce human errors to a minimum.

The answer to your second question is that, even though a great deal of attention has been given to this problem, basic concepts of design (e.g. physical detent and spring-loaded throttle) used in the F-9 are still being used but have been improved considerably.

A system safety engineering effort has been contractually imposed on both the F-14 and S-3 aircraft. Through this program, the Naval Safety Center is taking a close look at known safety hazards. The design of the throttle quadrant has been one area of concern expressed to the contractors and they are involved in studies to make throttle functions as foolproof as possible. In some aircraft the Air Force has gone to a latch across the throttle quadrant which physically prevents retarding throttles to CUTOFF. This design, however, requires an additional motion to secure an engine under emergency conditions. The Center advocates a throttle quadrant which is as simple to operate as possible, while still providing maximum assurance that inadvertent engine shut down will not occur. Members of the Safety Center System Safety Engineering Group will continue to monitor design efforts in this area. Hopefully, the final design of these new aircraft throttle quadrants will provide maximum safety.

Rotor Rule

FPO, San Francisco – While perusing "pearls of wisdom" from the November 1969 APPROACH, a rather disheartening article was encountered ("Helmet Save" in the "Notes from Your Flight Surgeon," page 34). Oh, it was well-written, timely, enlightening and interesting but it sent shivers down this old man's spine. To recap, it was the story of the UH-34D that made a forced landing due to loss of power, coming to rest imbedded in a sand bank. The hapless last crewmember evacuated the flailing helo before the main rotor blades had come to a complete stop. He did stop one blade with his helmet but luckily survived to relate his hairy tale.

Dipping back into my memory, dulled with age and misuse, I feel that one basic tenet of survival with "sling wingers" was violated. It's a rather simple rule but one easy to remember: "When flailing into the sea or bouncing upon the hard firmament, remember always that lest ye sever thy body from thy head, remaineth inside until all motion hath stopped and rotor blades have ceased to flappeth about the rotor mast."

It is with heavy heart that it must be noted that this rule was violated. "Without the protection of a helmet this would have been a different story" is the moral as quoted from the APPROACH article. I strongly feel that the inclusion of the rule: "Never depart or evacuate the helicopter until the rotors have stopped" would have wrapped the moral into a complete package.

R. L. Dalton
LCDR ASO
HS-2

• Yea, verily. Thy words have wisdom. Your excellent letter brings up a "must" if conditions (water, slopes, fire, enemy action, etc) permit waiting for rotors to stop. Our purpose in using the incident was to point out the necessity of keeping the hardhat on until well clear of the bird. Thanks for writing and the rest of you helicopter types keep those cards and letters coming.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Please Send Help

Numerous photographs are included in each issue of APPROACH. We believe they add eye interest and appeal, but more than that, photographs are often essential in "getting the story across." Unfortunately, our file of recent photographs depicting current aviation operations is somewhat depleted. We, therefore, request all you photogs, PAO types – and all others – who have recent photographs which depict naval aircraft flight or aviation ground operations in an interesting and effective manner to contribute them to the Editor, APPROACH. Please mark the photographs "For the APPROACH photo file." Upon receipt, we will file them for future use in illustrating APPROACH and MECH articles in an accurate and timely fashion.

SEEK-2 Kits

FPO, San Francisco – As a result of a recommendation made by the Jungle Escape and Survival Training School at

NAS Cubi Point, many members of this squadron and other Marine squadrons deployed in RVN wear the wrist compass found in the SEEK-2 kits permanently attached to their watch bands.

Our flight equipment officer informs us that once the SEEK-2 kit is unsealed to remove the compass, the kit is no longer usable and must be surveyed. We have written to the Aviation Supply Office, Philadelphia, and found that the wrist compass is not available on a single item basis and can only be obtained by removing it from a SEEK-2 kit.

I recommend that the wrist compass be made available on an individual basis, as well as being contained in the SEEK-2 kit.

A. W. Massey
CAPT USMC

• We feel at the present time that the compass in the SEEK-2 kit is adequate and accessible in an emergency. Our Safety Center Marine-type personal survival equipment officer recalls instructions in boot camp to the effect that a compass should never be used in close proximity to metal, in this case, your wrist watch and also, in some instances, the band.

Since the SEEK-2 kit is issued on a personal basis there is no necessity to survey a kit after an item has been removed as long as it is still in the individual's possession. Precedent for this is NavAirDevCen (Naval Air Development Center) recommended interim action on the problem of leaking insect repellent in the kit. (*Personal/Survival Equipment Crossfeed 10-69* refers.) NavAirDevCen advised that SEEK-2 kits should be opened and checked for damage. Leaking repellent containers should be removed. If the other items in the kit are not affected, retain the kit. If the whole kit is damaged, it should be turned in for a new kit which should then be opened and inspected. Unsatisfactory condition of kit items should be reported, as usual, by the submission of a UR (Unsatisfactory Report).

ACSEB 162

NAS Patuxent River, Md. – "Sequential Survival," page 32-33, November APPROACH, cites Air Crew Systems Change 162 which requires all pilots and aircrewmen except those wearing T-65 body armor to be equipped with and use the SV-2A survival vest. When I went to look this up in the interest of using this directive as "ammo" in my squadron survival equipment program, I was unable to find it. On checking further I discovered that the date of the change is not 28 March 1968 as stated in the November APPROACH but 28 March 1969.

LT F. G. Steiner
ASO, VP-56

• You're absolutely right – a slip of the typewriter!

Chafing Patch

FPO, New York – After submitting a UR (unsatisfactory report) and a Beneficial Suggestion, it occurred to us that probably the fastest way to disseminate this information to the people concerned is through your publication. We hope that it may help someone somewhere and maybe save a life.

Periodic checks of personnel flight deck life vests for proper inflation and function revealed that an unusual number of the bladders were punctured

Fig. 1

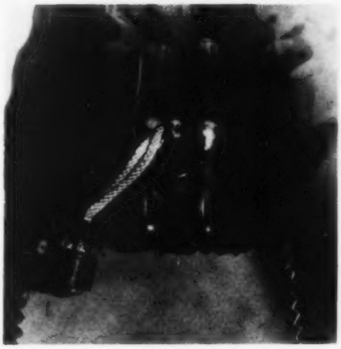


Fig. 2

in the vicinity of the CO_2 inflation manifold. A close check of the affected vests showed that the bottom of the manifold had some very sharp edges (left from manufacturing). These edges were being pressed and rubbed against the vest cover and bladder assembly during normal use until they wore or cut holes into (and sometimes completely through) the bladder (Fig. 1). The worst bladder found had three holes in it which would allow the bladder to deflate to the point that it would support a man in the water for no longer than three minutes.

As an interim measure we have incorporated a chafing patch onto the bladder just under the area that can be contacted by the inflation manifold (Fig. 2). After any holes in the bladder were patched, the naugahyde chafing patch was fastened with poopy suit glue. This fix seems to provide a very satisfactory solution since there have been no recurrences of the problem.

AME-1 A. E. Dickinson
PR-3 D. A. Carmichael
VAH-10, DET 59

• Thank you for sending this information to us. This is a fine example of passing the word for safety.

Vol. 15 **approach** No. 9

RADM Roger W. Mehle

Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Contents

Departments

NavWeps 00-75-510

Purposes and policies: Approach, published monthly by the Naval Safety Center, presents the most accurate information currently available on the subject of aviation accident prevention. Contents should not be considered as regulations, orders or directives and may not be construed as incriminating under Art. 31, UCMJ.

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Next Month

Don't Learn About Your Aircraft By Accident

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PHC Harry Culbertson, Photographer
K. E. Warmack, Editorial Assistant

Credits

This month's cover artist Blake Radar depicts the eternal vigilance of the RF-8A in seeking out the enemy and providing invaluable photographic evidence of his actions. **Pg 4 (top)** Photo courtesy Lockheed California. **Pg 8** Hi and Lois by Dik Browne, courtesy King Features Syndicate. **Pg 18, 20(bottom), 21** Photos courtesy NASA. **Pg 19** Photos courtesy Kaman Rotor Tips. **Pg 20 (top)** Photos courtesy The Billy Pugh Co. **OBC** Cartoon by Ballow courtesy General Dynamics.

U. S. NAVAL SAFETY CENTER

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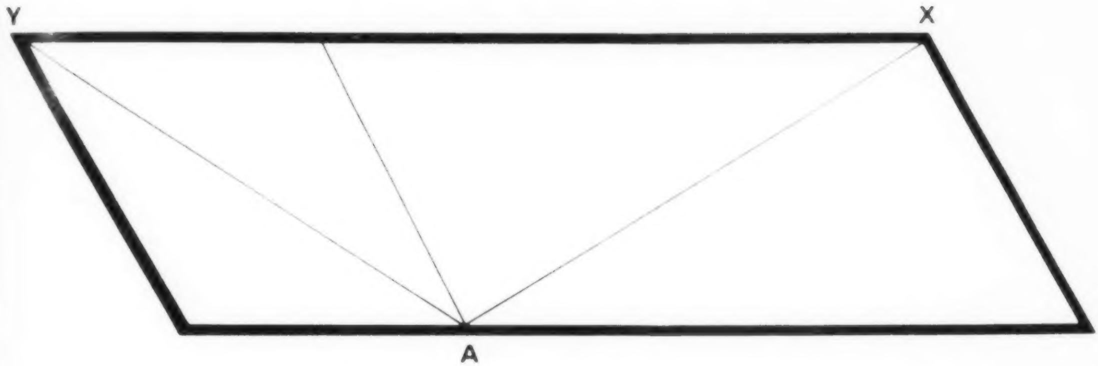
Illusions

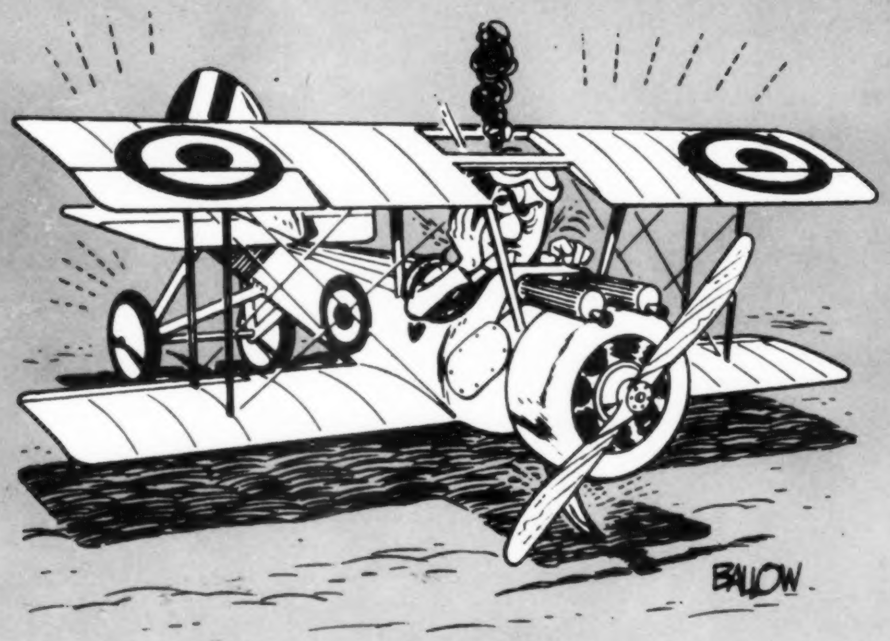


HOW much longer is line *AX* than line *YA*? Any answer except "None," is wrong; they're both the same length. Illusions are normal and all of us have had experiences with them. We can compensate for them or learn to ignore them. There are a number of aviation situations in which optical illusions can result in perceptual errors. For example, the width of a runway has a very definite bearing on its apparent length. A wide runway appears shorter than a narrow runway of the same length. It is a known fact that errors in pilot perception have caused or contributed to numerous accidents. Incorrect estimations of altitude, sink rates, rates of closure or distance frequently lead pilots to make dangerous or disastrous errors. You as a pilot must realize that this can happen and ascertain the accuracy of your visual interpretation. Whenever possible, have an alternate reference available such as an instrument indication, against which to double check any visual perception you suspect to be in error.

USAF ATC Approach To Safety

LIFT and DRAG

---and this was long before it was made a 'Law'



It was July 26, 1917. Before daylight, and with all blackout measures taken, Error Flynniven groped to his Sopwith Camel and mounted, ready for the coming day's Dawn Patrol.

Dawn quickly broke – as did pilot Error. You see, he found that if aeroplane parts can be installed backwards, some mechanic will do just that!

P.S. The mechanic was a fellow named Murphy.